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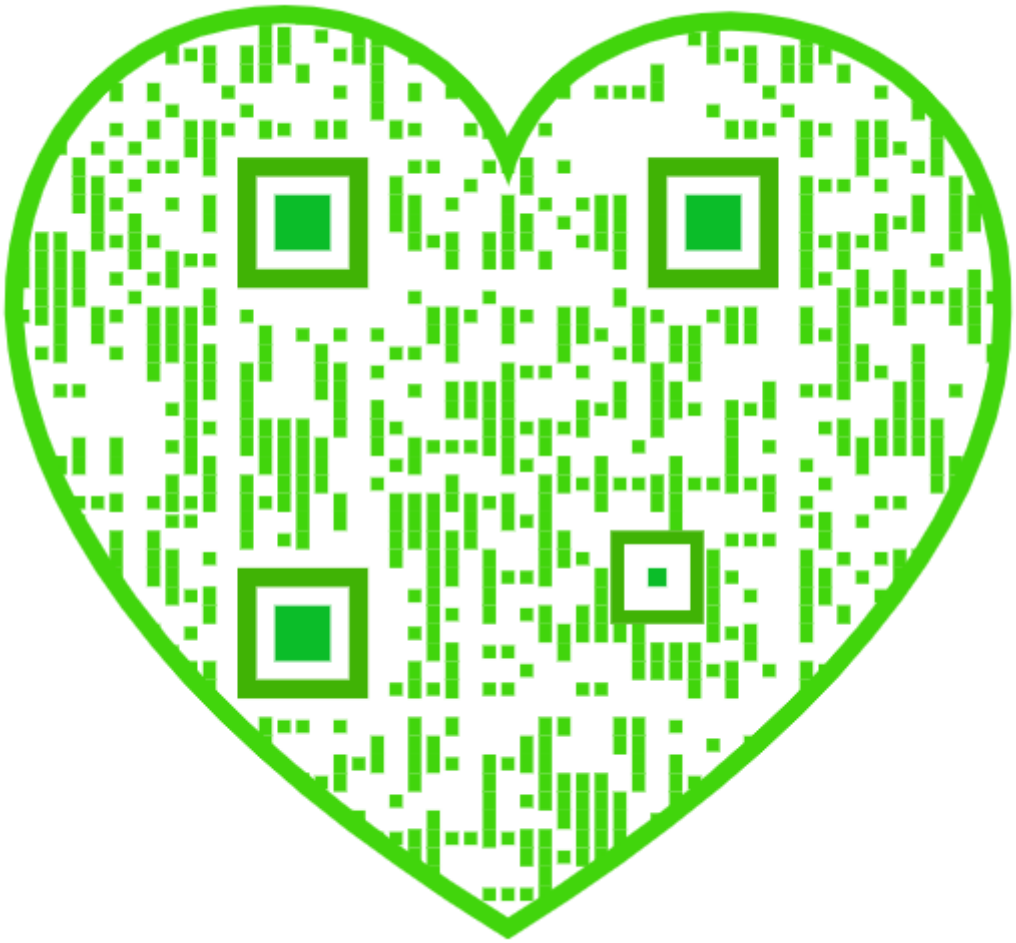

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THE STANDARD CYCLOPEDIA OF HORTICULTURE

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CI. Well-filled mixed border, with lilacs predominating.

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THE STANDARD CYCLOPEDIA OF HORTICULTURE

A DISCUSSION, FOR THE AMATEUR, AND THE PROFESSIONAL AND COMMERCIAL GROWER, OF THE KINDS, CHARACTERISTICS AND METHODS OF CULTIVATION OF THE SPECIES OF PLANTS GROWN IN THE REGIONS OF THE UNITED STATES AND CANADA FOR ORNAMENT, FOR FANCY, FOR FRUIT AND FOR VEGETABLES; WITH KEYS TO THE NATURAL FAMILIES AND GENERA, DESCRIPTIONS OF THE HORTICULTURAL CAPABILITIES OF THE STATES AND PROVINCES AND DEPENDENT ISLANDS, AND SKETCHES OF EMINENT HORTICULTURISTS

BY

L. H. BAILEY

Illustrated with Colored Plates, Four Thousand Engravings in the Text, and Ninety-six Full-page Cuts

IN SIX VOLUMES

VOL. VI—S–Z

AND SUPPLEMENT

PAGES 3043–3639. FIGS. 3516–4056

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Facing page

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S

SÀBAL (possibly a native name in South America, but the author of the genus does not explain). *Palmàceæ*, tribe *Córypheæ*. Spineless palms, low, tall, or almost stemless.

Trunk slender or robust, ringed or nearly smooth, creeping or erect, ascending at the base, clothed above with dead lf.-sheaths: lvs. terminal, orbicular or cuneate at the base, flabellately multifid; segms. linear, bifid, filamentous on the margins, induplicate in the bud; rachis short or long; ligule short, adnate to the rachis; petiole concave above, the margins smooth, acute; sheath short: spadices large, elongated, decompound, at first erect, the branches and branchlets slender, recurving, pendent; spathes sheathing the branches and peduncles tubular, oblique at the throat: bracts and bractlets minute: fls. small, glabrous, white or green: frs. small, globose, black, the short style basal. — Species probably 20, if Inodes is not separated. Fla. to Venezuela, and in Mex. Here belongs the palmetto or cabbage palm of the southern states. The best botanical account of the genus is Beccari's, Le Palmæ Americane della tribu delle Coryphеæ, pp. 10–83 (1907). Most of the species can be cult. in the temperate house, but any that may come into the trade from S. Amer. would require stove conditions. *S. Palmetto* can be grown outdoors from Charleston southward. *S. texana* and *S. exul* are handsomer species, and hardy in parts of Texas.

3516. Sabal Palmetto, the cabbage palmetto of the southern states.

The arboreous species of Sabal have been separated by Cook (Bull. Torr. Bot. Club, 28:529) as Inodes. These species also differ in their foliage. "The leaves of Sabal are adapted for standing erect and avoid resistance to the wind by being split down the middle. The leaves of Inodes which are held horizontal from an erect axis have attained the unique adaptation of a decurved midrib which braces the sloping sides of the leaf and effectively prevents the breaking above the ligule."

The cabbage palmetto (*S. Palmetto*) grows in groups of a few specimens to several hundreds or even thousands in the rich black soil on the banks of the St. Johns and Ocklawaha rivers of Florida, forming a glorious sight. They are found northward to South Carolina, but they attain their fullest development in Florida, where they always form an important feature of the landscape. Generally they grow in dense groups, but they are more beautiful in all their parts where they have room enough to spread. In southern Florida underneath the crown of leaves is often found a dense wreath of ferns (*Polypodium aureum*), which heightens the charm of these palms considerably. On the St. Johns the trunk is often covered with the trumpet creeper (*Campsis radicans*), or it is hidden by the dense foliage of the cross-vine (*Bignonia capreolata*), both of which form a beautiful ornament, especially when in flower. These suggestions of nature are often followed by planters who have a feeling for nature-like landscape effects. The cabbage palmetto thrives even in the poor sandy soil, and it is greatly improved by cultivation. Even good-sized trees are not difficult to transplant if the whole stem is carefully dug out and all of the roots and leaves are cut off. If the stem has been set at least 3 feet deep and the soil is kept well watered after planting, the palmetto is almost sure to live. In addition to the palmetto, all of the sabals mentioned in this work are cultivated by the undersigned on high pine land in southern Florida. Under these conditions the sabals have proved a great success, as also all species of Phœnix and all Cocos of the australis type, while the species of Washingtonia, Erythea,

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Livistona, and Trachycarpus have been an entire failure. *S. Blackburniana* is, in the judgment of some, the finest of all the fan-leaved palms that can be grown in Florida. All the species that form trunks are objects of great beauty when well grown. They need to be well fertilized, or the lower leaves will suffer and finally die, thus detracting much from the elegance of the specimen. They all grow naturally in rich black soil, but they all thrive exceedingly well in the sandy pine-woods soil if well fertilized and watered; in fact, they can hardly be fertilized too much, and the more nitrogenous manure and water they get the faster they grow. When transplanted they must be set deep. In planting palms make a hollow about 6 feet in diameter and about 2 feet deep in the center. This center, which receives the plant, is the deepest point, while the ground all around is slightly sloping. Care must be taken to remove the sand after heavy rains or the crown will soon be buried and the little plant dies. As the palm first forms the

3517. Sabal glabra.

trunk in the soil and as the growth is rather rapid, this precaution is not necessary after the plant has attained a few feet in size. (H. Nehrling.)

A. *Trunk evident, usually tall.*

B. *Foliage very glaucous.*

uresàna, Trel. (*Inòdes uresàna*, Cook). Trunk 15–35 ft. high and upward of 1 ft. diam.: lvs. glabrous, very glaucous; petiole stout, concavo-convex, unarmed, about 40 in. long, nearly 1 in. wide and nearly ⅜in. thick; blade about 40 in. long and wide, multifid, with coarse straw-colored fibers from the sinuses, the center arcuately recurved: fr. of a single developed carpel, depressed globose, ¾in. or less in diam., edible, green, or when dry dingy brown and somewhat glossy, the mesocarp then cottony; endocarp whitish straw-color, glossy within; seed polished, dark chestnut-brown, labyrinthiform-rugose, much depressed. Sonora, Mex., in the vicinity of Ures; intro. to cult. in S. Calif. R.H. 1910, p. 59. Described and figured in vol. 12 (1901) of Rept. Mo. Bot. Gard.—"From the two arboreous palmettos of the United States, *S. uresana* differs markedly in its pale, very glaucous foliage, and in the size of its fruit, which is of thrice the diameter of that of *S. Palmetto*, and usually a third larger than in *S. mexicana*, with the former of which species it agrees in having but one of the three carpels developed and fertile while in *S. mexicana* two or even all three are not infrequently developed. Considering the extent to which this section of Mexico has been visited by collectors of seeds it would be remarkable if this attractive plant should not prove to be already in cultivation in European gardens."

BB. *Foliage green or essentially so, at least above.*

mauritiæfórmis, Griseb. & Wendl.; also spelled *mauritiiformis*. Trunk middle-sized, but occasionally attaining 60–80 ft.: lvs. finally 12 ft. across; blade suborbicular, longer than the petiole, glaucous beneath, multifid to the middle, with loose fibers between the bifid lobes: spadix very long and much branched, appearing below the lvs.: fr. globose or inverted pear-shaped, about 1½ in. long. W. Indies.—The name *mauritiæformis* does not appear in the American trade, but *S. glaucescens*, Lodd. and Hort., probably belongs here, according to Grisebach. Nehrling writes: "*S. glaucescens* of the trade rivals *S. Blackburniana* in beauty and rapidity of growth. Its lvs., though smaller, have a beautiful bluish green color."

Palmétto, Lodd. (*Inòdes Palmètto*, Cook). CABBAGE PALMETTO. Fig. 3516. St. erect, 20–80 ft. high: lvs. 5–8 ft. long, cordate in outline, recurved at the summit, shorter than the petiole; segms. deeply cleft: spadix spreading, shorter than the lvs.: drupe black, ⅛–½in. long. N. C. to Fla. and Bahamas. S.S. 10:507. A.F. 12:628.—*S. Mocinii*, Hort., is referred to *S. Palmetto* by Voss, but Nehrling describes it as a stemless plant from Mex., more beautiful than the dwarf palmetto, bearing immense lvs. on strong stalks, the lvs. attaining a height of 6–8 ft. Others think *S. Mocinii* is the same as *S. Blackburniana*. *S. Palmetto* has been confused in the European trade with *S. texana*. Very commonly planted as a shade and avenue tree in the southern states.

Blackburniàna, Glazeb. (*S. umbraculifera*, Mart. *Inòdes Blackburniàna*, Cook). St. 30–40 ft. high, thickened at the middle: blade ample, orbicular, glaucous, rather rigid, shorter than the petiole; lobes about 40, ensiform, bifid, filamentous, rather rigid: spadix more branched than in any other species: fr. inverted pear-shaped, about 1½ in. long. W. Indies. G.F. 4:307. G.C. II. 2:777. Loudon's Gard. Mag. 5:52–7, with several figures. R.B. 35, p. 189.

causiàrum, Becc. (*Inòdes causiàrum*, Cook). PORTO RICO HAT-PALM. YARAY. Trunk to 40 or 50 ft. and 2 ft. thick, columnar or nearly so, light gray or nearly white: lf.-bases splitting into fibers and more or less remaining as long ribbons: lvs. about 12 ft. long, the blade and petiole about equal in length but both surpassed by the infl., the petiole keeled near the end above: fr. ⅛–½in. diam., grayish, with a finely rugose or nearly smooth chestnut-brown seed.

texàna, Becc. (*S. mexicàna*, Auth., not Mart. *Inòdes texàna*, Cook). Robust palm, to 50 ft. and 2½ ft. diam. of trunk which is bright reddish brown: lvs. 5–7 ft. across, shining and yellowish green, the segms. often parted and filamentose, the petiole stout and equaling or exceeding the blade: terminal branchlets of infl. slender: seed about ½in. broad, with a prominent micropyle. S. Texas. S.S. 10:508.

exúl, Bailey (*Inòdes exúl*, Cook). A strong vigorous tree with large crown of vivid green lvs., and green trunk due to the color retained in the sheathing lf.-bases: lvs. otherwise much like those of *S. texana:* branchlets of infl. thickened: fr. solitary, with large seed not wrinkled above nor hollowed below.—Described from handsome trees planted at Victoria, Texas, probably native of Mex. Hardy and promising.

prínceps, Hort. Large species with a stout trunk which is covered with the persistent bases of the old lvs.: lvs. very large, about 5 ft. long; blade divided into about 100 segms., chartaceous, green; segms. all

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rather shortly cleft at the apex, about 3 ft. long by 1½ in. broad, acuminate, pointed: fruiting spadices pendent, about 6 ft. long, forming a very dense panicle: spathe tubular-funnelform, striate, obliquely truncate: fr. black, shining, globose. Habitat unknown; cult. in S. Calif.—Resembles *S. Blackburniana*.

aa. *Trunk none or creeping.*

glàbra, Sarg. (*S. Adánsonii*, Guerns. *S. mìnus* or *mìnor*, Pers. *Córypha mìnor*, Jacq. not Linn.). Dwarf Palmetto. Blue Palm. Fig. 3517. St. short, buried in the earth so that the palm appears stemless: lvs. 2–3 ft. long; blade circular in its outline, somewhat longer than the petiole, glaucous; segms. slightly cleft at the apex: spadix erect, much longer than the lvs., 3–6 ft.: drupe ⅓in. thick, black. Southern states. B.M. 1434. —Often cult. outdoors in the southern states. There are different forms, apparently unknown to the trade.

megacárpa, Small (*S. Etònia*, Swingle). Scrub Palmetto. Low shrub, the sts. elongated, creeping, and contorted: lvs. standing 4–5 ft. high, the sharp-edged petioles exceeding the nearly orbicular blades which are 1½–2½ ft. across, deeply cleft at apex and segms., longer than body, filamentose: infl. 2–2½ ft. long, ascending but becoming prostrate, branching: perianth yellowish white: fr. nearly globose, ½–¾in. diam. Fla.

The following are mostly trade names, but at present they can be only imperfectly described: *S. cærulèscens*, Bull. A native of Colombia intro. in 1875. Apparently only the juvenile state has been described. Lvs. elongate, linear-lanceolate, plicate, with a bluish or glaucous green color which is very strongly marked on the under surface. Nehrling writes that he cannot distinguish at present his specimens of S. cærulescens from S. glaucescens.—*S. dealbàta*, Hort. "This species," writes Nehrling, "reminds one of S. Mocinii, although it is smaller in all its parts. The lvs. are numerous, glaucous green and of a fine fan-shaped form. Compared with the sabals that form a trunk, these stemless species have little beauty, though they look well as foliage plants in company with Cycas revoluta and Dioon edule." The name "dealbata" means whitened, but it appears to be unrecognised in botanical literature in connection with Sabal.—*S. Ghiesbréchtii*, Hort., is S. Palmetto, at least so far as some gardens are concerned, but Beccari considers it an European name applied to cult. plants of S. Palmetto.—*S. glaùca*, Hort. Pitcher & Manda, 1895, may possibly be meant for S. glaucescens.—*S. havanénsis*, Lodd., according to Nehrling, "is a more upright grower than S. Blackburniana, has a slender st. and the lf.-stalks are longer and thinner. The lvs. have a bluish green color while young, changing to a fine dark green when they get older." Habitat unknown and the name has no botanical standing. —*S. Hodgendorpii*, Hort., is Livistona Hoogendorpii.—*S. jaxónica*, Hort., Pitcher & Manda, is possibly meant for S. havanensis, since Sabal is an American genus and is not known in Java.—*S. longifòlia*, Hort., according to Nehrling "has very numerous, long and slender lvs. which are bright green above and silvery below."—*S. longipedunculàta*, Hort., according to Nehrling, "is a stemless plant with smaller lvs. than those of S. Mocinii and very long and slender stalks." Reasoner adds that the lvs. are glaucous green. The last two are known only by these trade names, and are not certainly referable to any maintained species. L. H. B.†

SABÀTIA (named after Liberatus Sabbati, an Italian botanist of the eighteent century); also spelled *Sabbatia*. *Gentianàceæ*. Hardy annual or biennial (rarely perennial by stolons) herbs, making showy garden or border plants, although little grown.

Leaves opposite, sessile or clasping: fls. showy, rose-pink or -purple or white, in cymose panicles terminating the branches; calyx 5–12-parted, the lobes slender; corolla rotate, 5–12-parted, usually with a yellow eye: caps. globose or ovoid, 2-valved.—About 18 or 20 species, N. Amer. and Cuba, mostly on the coastal plain. Sabatias require a light sweet soil. Seed may be sown in fall or early spring. The plants are easily transplanted. Some of them grow in brackish places.

a. *Fls. 5-parted, rarely 6–7-parted.*

brachiàta, Ell. St. slightly angled, 1–2 ft. high: lvs. linear to linear-oblong, obtuse, obscurely 3-nerved at the base: fls. showy, light rose to white, 1–1½ in. across, in thyrsiform panicles, the lateral peduncles bearing usually 3-fld. cymes; calyx-lobes linear, shorter or nearly equaling corolla. Ind. to N. C. and south.

lanceolàta, Torr. & Gray. St. simple, 1–3 ft. high: lvs. about 1 in. long, shorter than internodes, ovate-lanceolate or ovate, acute, 3–5-nerved, the floral reduced to subulate bracts: fls. about 1 in. across, white, fading yellowish; calyx-lobe more than half length of corolla. May–Sept. Pine-barrens, N. J. to Fla.

angulàris, Pursh. St. somewhat 4-wing-angled, 1½–2 ft. high: lvs. ovate, 3–5-nerved: fls. fragrant, showy, light rose to white, 1–2 in. across, in much-branched pyramidal or somewhat corymbose cymes; calyx-lobes linear, much shorter than the corolla. Rich, light soil in open fields. W. Canada to Fla.

aa. *Fls. 8–12-parted.*

dodecándra, BSP. (*S. chloroìdes*, Pursh). Apparently perennial, usually in brackish marshes near the coast from Long Island southward: to 2 ft. high: lvs. oblong to oblong-lanceolate, blunt or somewhat acute: calyx-lobes herbaceous, 3–5-nerved; corolla rose-colored or white with yellow spot at base of each oblong-spatulate or oblanceolate segm. S. **Kennedyàna,** Fern., is the New England representative, of fresh pond-shores, earlier-flowering: freely stoloniferous, to 2½ ft.: basal lvs. oblanceolate-acuminate; st.-lvs. shorter, firm, lance-acuminate and subulate: calyx-lobes not herbaceous, linear-subulate; corolla-lobes cuneate-obovate, rounded or emarginate at summit, with much broader yellow spot. L. H. B.†

SÀBIA (from its Bengal name, *Sabja-lat*). *Sabiàceæ*. A genus of about 20 species of woody vines or sarmentose shrubs native to India, China, and Japan, with alternate petioled entire deciduous lvs. and axillary, solitary, or cymose, rather small and dull-colored, greenish, purplish, brownish, or yellow fls. followed by small blue drupe-like frs. Fls. perfect, 5-, rarely 4-merous; petals short, semi-orbicular to ovate; petals oval to oblong; stamens shorter than petals; ovary superior, 2-celled, each cell with 2 ovules: drupes usually reniform, blue, solitary or 2 and slightly cohering at the base, 1-seeded; stone reticulate.—Only the following recently intro. species is in cult., but little is yet known of its cultural requirements; at the Arnold Arboretum it is growing well under ordinary conditions and has proved hardy. Prop. is by seeds and probably by cuttings. S. **Schumanniàna,** Diels. Climbing shrub, to 10 ft., glabrous: branchlets green: lvs. petioled, oblong-lanceolate, rarely elliptic, acuminate, broadly cuneate at the base, bright green, reticulate beneath, ½–4 in. long: fls. greenish to greenish-purple, cup-shaped, ⅛in. across, in slender-stalked, nodding, usually few-fld. cymes; peduncle filiform, 1–1½ in. long: fr. reniform, ¼in. broad; stone slightly compressed, reticulate. W. China.—The drooping blue frs., if freely produced under cult., apparently constitute the chief ornamental feature of this species.

Alfred Rehder.

SACCHÁRUM (*saccharon*, old Greek name for sugar). *Graminèæ*. The sugar-cane group, little grown for ornament, although making bold specimens.

Tall grasses with stout culm and ample panicles, the branches many-jointed: spikelets small, slender, 1-fld., surrounded by long silky hairs.—Species 12, in tropical regions, mostly of the Old World. Differs from Erianthus in having awnless spikelets. The most important species is the sugar-cane, which is extensively cult. in tropical and subtropical countries for the production of sugar. Prop. by cuttings of the st. Native country unknown, but probably E. Asia. Cult. from time immemorial by cuttings, for which reason many varieties have lost the power to flower or at least to produce fertile seed. Rum is produced from the fermented molasses.

officinàrum, Linn. Sugar-Cane. St. 8–20 ft. high, 1–2 in. thick. Dept. Agric., Div. Agrost., Bull. 20:18. G.W. 8:261 (under the name *S. officinale*).—The different cult. varieties are distinguished by color and height of st.

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spontàneum, Linn. Less tall and stout than sugar-cane, freely blooming, found in the Medit. region, where it is sometimes cult. as a hedge-plant, and throughout the tropics of the Old World. A variety of this, *S. ægyptiacum*, is shown in Gn. 11, p.78; 16, p. 323.

ciliàre, Anders. Lvs. very narrow, channeled, glaucous, the lower erect. Intro. from India.—Said to make large clumps and to be hardy at Santa Barbara, Calif., but not known to bloom there. A. S. Hitchcock.

SACCOLÀBIUM (name refers to the saccate labellum). *Orchidàceæ*. Epiphytic herbs with erect leafy stems increasing in length by continued growth at the apex, grown in warm glasshouses.

Leaves distichous, leathery and fleshy, usually channeled: infl. lateral, in the cultivated species a long, densely fld. cylindrical raceme; fls. medium or small; sepals subequal, free, spreading, the lateral pair not decurrent on the base of the column; petals similar, sometimes wider; labellum united with the base of the column, spurred, the mouth of the spur open; pollinia on a filiform stipe.—About 20 or more species. Can be prop. by offsets and by cut-backs. Fresh stock is constantly imported.

This interesting genus embraces a number of pretty and distinct species from Borneo, Cochin-China, India, Java, and Philippines. They are closely allied to the genera Aërides, Phalænopsis and Vanda, and require somewhat similar treatment, but do not always acclimatize themselves as readily to artificial cultivation unless given a location with more or less natural surroundings, although some of the more free-growing species, like *S. ampullaceum*, *S. curvifolium*, *S. cœleste*, and *S. Hendersonianum*, can usually be grown successfully in the cattleya or cypripedium department. The large-growing species with thick succulent leaves require a warm moist atmosphere where the winter temperature can be retained at 65° to 70° F. by night and about 75° during the day, and in the summer or growing season 10° in advance of this. All succeed best when suspended from the roof in pans, baskets or on blocks where they can have free circulation of air about them at all times, receive indirect benefit of the sun's influence, which will harden their tissue, and where the compost may readily and frequently dry out, during the resting period especially. Grown otherwise the more succulent species, such as *S. giganteum* (a Vanda), make soft weak tissue, which is susceptible to wet-spot, a usually fatal disease. Clean chopped sphagnum, freely interspersed with broken pieces of charcoal, is the most satisfactory growing material, and this should not be pressed in so firmly as entirely to exclude access of air to the roots, but the plants must always be firmly secured with pieces of charcoal, potsherds or other similar material, or securely fastened with copper wire to keep them in position, otherwise being more or less top-heavy they are liable to work loose, under which conditions they cannot become properly established. Shading should be applied to the glass from February until November to break the sun's direct rays, but during the remainder of the year when the solar light is weak its direct influence will be found beneficial. In bright weather in the growing season the plants need a liberal supply of water, both at the roots and over the foliage, but during the resting period and in wet inclement weather, water and syringing must be carefully and sparingly administered. Judgment in this respect is very essential to the successful culture of these plants. The supply of saccolabiums is kept up by fresh importation. These cultural directions apply also to the genus Rhynchostylis. (Robert M. Grey.)

A. *Fls. rose-colored.*

Hendersoniànum, Reichb. f. Dwarf: lvs. 4–6 in. long, strap-shaped, subacute, distichous on the sts. but spreading in various directions: raceme upright, about as long as the lvs.; fls. forming a cylindrical mass, bright rose, ⅔in. across; dorsal sepals orbicular, concave, lateral ones larger, obovate-oblong; petals obovate; labellum a blunt, straight spur with 3 teeth at the mouth, white. Borneo. B.M. 6222.

ampullàceum, Lindl. Fig. 3518. Dwarf: st. 6–8 in. high, with 2 rows of lvs.: lvs. strap-shaped, channeled, apex truncate and dentate: racemes nearly erect, 4–6 in. high; fls. deep rose-color; sepals and petals ovate, veined, spreading out flat; labellum linear-falcate, one-half as long as the petals; spur slender, straight. May, June. N. India. B.M. 5595. P.M. 13:49. J.H. III. 32:463. Var. **moulmeinénse,** Hort., is a geographical variety with stronger growth and larger fls.

AA. *Fls. orange or scarlet-orange.*

curvifòlium, Lindl. Sts. short: lvs. linear, 8–10 in. long, 2-toothed at the apex: racemes somewhat drooping, 6 in. long, dense; fls. 1 in. across, bright orange-scarlet; sepals and petals ovate to obovate, spreading;

3518. Saccolabium ampullaceum. (×½)

labellum orange, blade linear, truncate, spur obtuse. May, June. Burma, Java. B.M. 5326 (as *S. miniatum*). I.H. 13:493.

cèrinum, Reichb. f. St. short, thick: lvs. strap-shaped, obtusely 2-lobed: raceme dense, half drooping; fls. orange, with a paler spur; sepals oblong; petals ovate. Sunda Isls.

AAA. *Fls. white, spotted with blue.*

cœléste, Reichb. f. Plant rarely 1 ft. high, with decurved lvs. and erect, densely fld. racemes 6–9 in. long: fls. white, with the front of the lip and the tips of the segms. sky-blue; sepals and petals cuneate, oblong, obtuse; labellum rhomboid, spur compressed, curved. July, Aug. Siam. J.H. III. 28:87; 46:25.

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S. bellìnum, Reichb. f. Sts. short: lvs. 7–12 in. long.: fls. fleshy, 1¼ in. across; sepals and petals spreading, somewhat incurved, similar, obovate-oblong, yellow, blackish-purple-blotched; lip subglobose saccate and with a lunate blade, the former white, purple-spotted, the blade 2-lobed, pubescent above, fimbriate-denticulate, white, with the disk orange-yellow, purple-spotted. Burma. G.C. III. 39:419. J.H. III. 48:423.—*S. Blùmei*, Lindl.=Rhynchostylis retusa.—*S. dasypògon*, Lindl. Allied to S. bellinum. Sepals and petals yellow; lip white with purple markings. Nepal.—*S. frágrans*, Par. & Reichb. f. Fls. numerous, white, violet-scented; lip mauve-purple. Burma.—*S. Fürstenbergiànum*, Schlecht. Infl. branched; fls. rose-red with paler spur and white column. Siam. O. 1912:68.—*S. gigantèum*, Lindl.=Vanda densiflora.—*S. glomerâtum*, Rolfe. Sts. trailing, often 1–3 ft. long: racemes densely many-fid.; fls. small, yellow, spotted and striped with browniah red. Borneo. G.C. III. 54:317.—*S. grácile*, Lindl. "A very elegant little species, with slender growths and long decurved racemes of many small white fls." Ceylon.—*S. guttâtum*, Lindl.=Rhynchostylis retusa.—*S. Harrisonidnum*, Hook.=Rhynchostylis violacea var. Harrisonianum.—*S. illùstre*, Hort., probably=Vanda densiflora var. illustre.—*S. penangiànum*, Hook. f. A small plant, only a few inches high: fls. with light yellow sepals; side lobes of lip and wings of column narrowly margined with purple. Malay Penins.—*P. platycalcarâtum*, Rolfe. Dwarf herb: fls. very small, with sepals and petals yellow, spotted with brown. Burma.—*S. præmórsum*, Lindl.=Rhynchostylis retusa.—*S. Regnièri*, Hort. Plant small: fls. in short racemes, orange-colored.—*S. retùsum*, Voight=Rhynchostylis retusa.—*S. Rheèdii*, Wight=Rhynchostylis retusa.—*S. rubéscens*, Rolfe. Sts. a foot tall: lvs. oblong, 5–6 in. long, 1–1¼ in. broad: racemes 3–5 in. long, many-fid.; fls. ¼in. long, light rosy purple; dorsal sepal elliptic, obtuse, ¼in. long, lateral sepals ovate; petals elliptic, obtuse, ¼in. long; lip 3-lobed. Annam. B.M. 8121.—*S. sarcochiloides*, Schlecht. Racemes spreading, short; fls. small, lasting only a day, white; sepals and petals with violet-red spots on base; lip with orange-yellow side lobes. Philippines.—*S. violàceum*, Reichb. f.=Rhynchostylis violacea.

GEORGE V. NASH.†

SACCOLÒMA (from Greek for *sac* and *edge*, referring to the indusia). *Polypodiàceæ*. A group of tropical ferns, somewhat related to Davallia. They are pinnately divided, often of large size, and with scaly petioles; petioles and pinnæ not jointed to their points of attachment: indusia attached along one side at the base.

inæquàle, Mett. (*Davàllia brasiliénsis*, Hook.). A large stove fern with creeping rootstock: lvs. as much as 6 ft. long, twice-pinnate or more. Common in the American tropics.

R. C. BENEDICT.

SADLÈRIA (named after Joseph Sadler). *Polypodiàceæ*. Arborescent ferns suitable only for the warm-house: about 3–4½ ft. tall: lvs. large, tufted, double-pinnate, all similar: sori continuous, close to the midrib on each side: receptacle elevated; the involucre narrow, of the form of sorus, leathery, at first wrapped over the sorus, later spreading.—About 5 species, Hawaiian Isl. *S. cyatheoìdes*, Kaulf. About 3–4 ft. high: the stipe strong, erect, 6–18 in. long, naked except at the base and there clothed with long-linear scales: fronds 4–6 ft. long, 9–18 in. broad; pinnæ 8–12 in. long, ⅛–¾in. broad, cut down to the rachis into very many, connected, linear pinnules, ⅜–½in. long, acute or bluntish. Hawaii. G.C. II. 7:761. G.Z. 22, p. 122.

SAGE (*Salvia officinalis*). A sweet-herb, used for seasoning, and somewhat in domestic medicine.

For at least three centuries this shrubby fibrous-rooted perennial from southern Europe has been widely cultivated in kitchen-gardens for its aromatic whitish green wrinkled oval leaves. These are arranged oppositely on ascending or decumbent branching stems which seldom exceed 18 inches in height. In early summer the upper parts of these bear generally blue, though sometimes pink or white flowers, followed by almost black spheroidal seeds borne in the open cups. The name Salvia is derived from *salvo*, to save, in reference to the plant's use in ancient medicine; the name sage, from its supposed power to make people wise by strengthening the memory. In modern medicine it is but little used. In domestic practice, however, it is credited with tonic, sudorific, carminative, anthelmintic, and stomachic properties, and is frequently used as a gargle for aphthous affections of the mouth and pharynx. Its pleasant, though powerful-smelling, bitterish leaves are used for flavoring sausages and some kinds of cheese, for seasoning soups and stews, but mainly for dressings with luscious strong meats such as pork, goose, and duck. Among culinary herbs it ranks first in America, being more widely cultivated than any other except parsley, which is more largely employed for garnishing than as a flavoring agent. When possible the young leaves should be used fresh, for unless carefully dried they lose much of their aroma, which is due to a volatile oil and which even with careful curing rapidly dissipates. For best results the shoots should be gathered before flower-stems develop, because they are then richer and because later cuttings may be made. For drying upon a commercial scale, since this plan is thought to involve too much labor, the plants are cut in August if seed has been sown early, and the stumps, if not too short, produce again in late autumn; or if grown as a secondary crop, which is the common way, they are cut only once—namely, in autumn. Plants grown from cuttings (see below) will often produce three crops in a season. Upon a small scale, a warm airy room is best for drying, the plants being either laid loosely upon racks or the floor, or hung from the ceiling and walls. Upon a larger scale, a fruit-evaporator with a steady current of warm air at about 100° F. may be used. After drying, the leaves are rubbed to a powder and stored in air-tight vessels.

Sage does best in an open sunny aspect and a well-drained mellow loam of medium texture, rich in humus and nitrogenous matter. Stable-manure or a fertilizer containing potash, phosphoric acid, and nitrogen should be applied before the plowing, if done in the spring. Fall plowing is generally preferred when sage alone is to occupy the land. In each case plowing should be as deep as the surface soil will profitably permit. Thorough fining of the soil must precede, and clean cultivation follow planting, the plants being set in drills about 15 inches apart and 10 inches asunder for manual cultivation, or 18 to 21 inches apart and 10 inches asunder for power cultivation. The former method is, as a rule, more profitable though more laborious. After harvesting (see above) if the bed is to be permanent, northern plantations should be mulched with marsh-hay or other material free from weed seeds. For garden practice it is common to divide the clumps biennially, since the plants become straggling if left longer. Upon a commercial scale, however, it is better to rely upon cuttings or seedlings.

Propagation may be by seed, cuttings, layers, or division. Seed, the vitality of which lasts three years, may be drilled thinly in flats in greenhouse, hotbed, or coldframe in early spring; or out-of-doors as soon as the ground becomes dry enough, in specially prepared beds of fine soil, covering them about ½ inch deep. In the former case the plants must be pricked out and hardened off to render them stocky and hardy before transplanting; in the latter, they are taken directly to the field. This operation may be performed from mid-June until late July, the plants being not less than 2 to 3 inches tall. The former method, which is considered the better, is the common commercial practice. Cuttings may be of mature or of immature wood. With each, shade and moisture are essential to success. Mature wood cuttings, made in early spring, should be ready for the field in less than six weeks; immature, taken from outside shoots just before they would form blossom-heads, are left in the cutting-bed until the following year. Such plants are usually more prolific than those grown from mature wood or from spring seedlings, and are, therefore, best when sage alone is to occupy the land. But when it is to follow some early vegetable, mature wood cuttings or seedling plants will probably be found best, though little or nothing can be cut before September. As practised by market-gardeners in the vicinity of New York, each of the above methods has its advocates, but practically all agree upon the plowing and harrowing of the ground in June or

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July after harvesting an early crop, such as beets, cabbage or peas. About twice in the three weeks after setting the plants, the field is raked to destroy sprouting weeds and to keep the surface loose, after which, if well done, but slight hoeing is necessary. In September, when the plants crowd each other, each alternate plant or row of plants is cut for sale and the remainder allowed to fill the space. At the first cutting each plant should make about two marketable bunches; at the second at least three. This practice not only insures plants full of leaves at each cutting but at least doubles the quantity in the end.

In America the green broad-leaved varieties are in far greater demand than the colored and the narrow-leaved kinds. The best variety known to the writer is Holt Mammoth, which is exceptionally prolific of large leaves. It is said to produce no seed. M. G. KAINS.

SAGÈNIA. A generic name for a group of tropical ferns here referred to Tectaria, from which there is no valid distinction. For *S. decurrens* see *Tectaria decurrens*.

SAGERÈTIA (after Augustin Sageret, French botanist, 1763–1851). *Rhamnàceæ*. A genus of about 15 species of armed or unarmed often scandent shrubs native to the warmer parts of Asia, in Amer. from N. C. to Mex., with opposite or nearly opposite, entire or serrulate, small, deciduous or persistent lvs. and with minute whitish fls. in terminal or axillary spikes or panicles, followed by small berry-like, mostly purple frs. Fls. perfect, 5-merous; the hooded petals and the stamens not exceeding the sepals; disk cup-shaped, 5-lobed; ovary superior, 2–3-celled with a short 2–3-lobed style: fr. a small globose drupe with 2–3 leathery nutlets.—These plants are little known in cult. *S. theezans* has been recently intro. by the Dept. of Agric.; according to F. N. Meyer it may be useful as a hedge-plant and its fls. have a delightful fragrance which attracts numerous insects; it is apparently not hardy N., while *S. pycnophylla* has proved hardy at the Arnold Arboretum. The American *S. minutiflora* is not recorded as being in cult., but may possibly have been planted in collections in the southern states. The frs. of some species are sweet and edible. Prop. is by seeds and probably by cuttings like berchemia which it resembles in habit and general appearance. **S. theèzans,** Brongn. Spinescent shrub, to 6 ft., with slender spreading branches: lvs. persistent, or subpersistent, short-petioled, ovate or oval, obtusish, subcordate or rounded at the base, minutely serrulate, lustrous above, glabrous or at first slightly villous beneath, ⅓–1 in. long: fls. sessile in villous spikes ½–1 in. long or sometimes longer and forming terminal panicles leafy at the base; sepals slightly pubescent outside: fr. purplish black, about ⅛in. across. Fls. in autumn; fr. in spring. China. **S. pycnophýlla,** Schneid. Similar to the preceding species: lvs. smaller, ⅓–½in. long, rarely nearly ¾in. long, sometimes acutish: fls. white, glabrous, in slender glabrous spikes ½–1½ in. long, usually only 1–4 at the ends of the branchlets. W. China. **S. minutiflòra,** Trel. (*S. Michàuxii*, Brongn.). Spinescent, straggling or trailing shrub: lvs. short-petioled, leathery, ovate to ovate-oblong, acute, serrulate, pubescent while young, glabrous and lustrous at maturity, ½–1½ in. long: fls. 1/10in. across, in terminal and axillary slender sometimes panicled spikes: fr. ⅛in. across, often gibbous, purple. Fls. in autumn: fr. in spring. N. C. to Fla. and Ala. ALFRED REHDER.

SAGÌNA (Latin, *fatness;* perhaps alluding to the forage value). *Caryophyllàceæ*. PEARLWORT. Annual or perennial tufted herbs, sometimes used for edging.

Leaves awl-shaped: fls. small, usually comparatively long-stemmed; sepals 4–5; petals 4–5, entire or slightly emarginate, minute or none; stamens equal in number to the sepals or twice as many; ovary 1-loculed, many-seeded; styles of the same number as the sepals and alternate with them.—About 50 species, natives of the temperate and colder regions of the world.

subulàta, Wimm. (*S. pilífera*, Hort. *Spérgula pilífera*, Hort. *Spérgula subulàta*, Sw.). PEARLWORT. An evergreen, hardy, densely tufted little plant, covering the ground like a sheet of moss: lvs. very small, stiff, aristate on the margin, linear: sts. branching and creeping: fls. white, studded all over the plant on long, very slender peduncles. July–Sept. Corsica. R.H. 1896, p. 435. R.B. 20:153. Var. **aùrea** has lvs. marked with yellow. A good rock-plant in shady places. Cult. similar to arenaria. Prop. by division.

F. W. BARCLAY.

SAGITTÀRIA (*sagitta* is Latin for arrow, referring to the arrow-shaped leaves). *Alismàceæ*. ARROWHEAD. Perennial hardy herbs useful for foliage effects in bogs and shallow ponds and also for their white buttercup-like flowers.

Plants of mostly erect habit, aquatic, the lvs. and scapes arising from more or less tuberous or knotted rootstocks: lvs. typically arrow-shaped, with long basal lobes, but sometimes long and linear: fls. imperfect, monœcious (staminate fls. usually in the uppermost whorls) or dicœcious, with 3 white broad petals and 3 small greenish sepals, the stamens and pistils numerous, the latter ripening into small achenes; infl. composed of successive whorls of 3-stalked fls. Sometimes the lvs. are floating. The number of species admitted is variable, but Buchenau in the last treatment of the genus in Engler's Das Pflanzenreich, hft. 16 (iv. 15, 1903) describes 31. Temperate and tropical regions of the world though lacking in Afr. and Austral.

3519. Common arrowhead.—Sagittaria latifolia; often known as S. variabilis. (×½)

Sagittarias are mostly used for colonizing in the open, but *S. montevidensis*—now the most popular species—is grown in indoor aquaria or plunged in open ponds in the summer. The arrowheads are perennials of easy culture, although likely to be infested with aphis. Propagation is by division, or sometimes by seeds.

A. *Sepals of pistillate fls. (usually in the lower whorls) erect after flowering, and the pedicels of these fls. thick: carpels not glandular.*

montevidénsis, Cham. & Schlecht. GIANT ARROWHEAD. Very large, sometimes growing 6 ft. tall, with lf.-blades 1–2 ft. long: lvs. arrow-shaped, with long, diverging, sharp basal lobes: fls. very large (2 to nearly 3 in. across), the rounded petals white with a purple blotch at the base. Argentina to Brazil, Chile, and Peru. B.M. 6755. Gn. 27:8. G. 17:273. G.W. 4, p. 68. G.Z. 30:241. I.H. 31:543.—First known as a cult. plant from seeds sent to England in 1883 from Buenos Ayres by John Ball. It is now a popular plant for aquaria

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and lily-ponds. Tender to frost. It is sparingly naturalized in the southern parts of the U. S., on both the Atlantic and Pacific sides.

AA. *Sepals of pistillate fls. reflexed after flowering: pedicels of these fls. slender: carpels somewhat glandular.*

B. *Bracts at base of whorls united, as if only 1.*

subulàta, Buch. (*S. nàtans,* in part. *S. pusilla,* Nutt.). Slender and simple, usually only a few inches high: lvs. linear or narrowly oblanceolate, rigid: fls. few, usually in 1 whorl, white, ½–¾in. across, the filaments broad. N. Y. to Ala., along the coast.—Offered by dealers in native plants. A plant once sold as *S. natans* is said to have come from the Amazon Valley; from this the form known as "New Era" was derived; and a cross of the latter with "*S. lanceolata*" (*S. lancifolia?*), native in La., gave the form "Francis M." *S. natans,* Pallas, the accepted species under this name, is native in N. Eu. and Siberia.

BB. *Bracts 3, at base of the whorls.*

C. *Lvs. usually distinctly sagittate.*

latifòlia, Willd. (*S. variàbilis,* Engelm.). Fig. 3519. Very variable in stature and shape of lvs., ranging from a few inches to 3–4 ft. tall: lvs. mostly broad-sagittate with long basal lobes, but running into very narrow forms: fls. clear white, about 1 in. across, usually monœcious, the filaments slender: achene winged, with a lateral or oblique beak. Common everywhere in margins of ponds and lakes, and offered by dealers in native plants for colonizing in bog-gardens and in lily-ponds. There is a double-fld. form known as *S. variàbilis fl.-pl.,* Hort., which probably belongs here. G. 29:31.

sagittifòlia, Linn. OLD-WORLD ARROWHEAD. Rhizome thick and tuberous, stolon-bearing: lvs. broad and sagittate, very variable in form and size: scapes erect, simple or branched, overtopping the lvs.: bracts narrow-ovate, free or slightly connate at base, shorter than the pedicels: petals large, white; filaments glabrous: achene nearly or quite orbicular and in this respect differing from the allied American species. Throughout Eu. and Asia.—By some authors the American *S. latifolia* and others are considered to be con-specific. Var. **flòre-plèno,** Hort. (*S. japónica,* Hort. *S. japónica fl.-pl.,* Hort.), is a form with double fls. common in cult. G.C. III. 30:171. Gn. 74, p. 67. G.M. 44:779. G.W. 3, p. 621. J.H. III. 43:219.—*S. chinensis* of most trade-lists is apparently one of the many forms of this species. There appears to be another *S. chinensis* in the trade, with lanceolate lvs., the botanical position of which is undetermined.

CC. *Lvs. usually oblong or linear and not sagittate.*

D. *Filaments slender, tapering upward, cobwebby.*

lancifòlia, Linn. Erect and somewhat rigid, glabrous, the scape sometimes reaching 5 ft.: lvs. lanceolate to narrow-oblong to nearly linear, nerved from the thick midrib: fls. white, in several whorls. Swamps, Del. to the tropics.

DD. *Filaments abruptly broadened, pubescent.*

gramínea, Michx. Erect and simple, glabrous, 2 ft. or less high: lvs. reduced to phyllodia, flat, broad-linear to lance-elliptic, pointed: fls. small, white, in 2 or 3 whorls. Newfoundland to Gulf.

S. macrophýlla has appeared in trade-lists as "a variety with large foliage and tall lax spikes of white fls." Its botanical position is uncertain as there are two distinct things of this name, one a valid species, the other a large-lvd. form of S. sagittifolia.

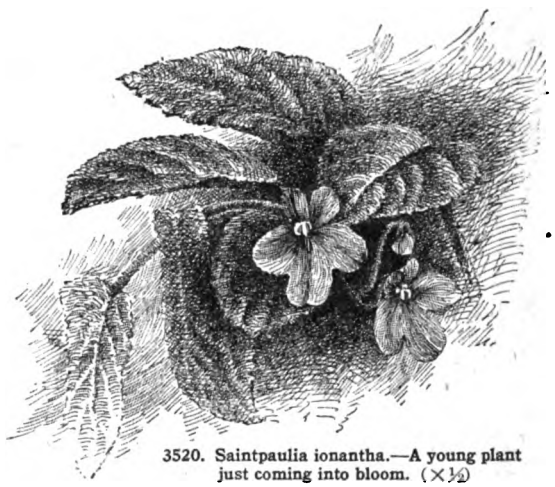
F. TRACY HUBBARD.†

SAGUÈRUS (East Indian name). *Palmàceæ.* An older name for Arenga, but discarded by the "nomina rejicienda" of the Vienna rules. *Aréngа mindorénsis,* Becc. (*Saguèrus mindorénsis,* O. F. Cook), has recently been intro. by the U. S. Dept. Agric. from the Philippines. It is described as a palm 5–10 ft. high, and probably of decided ornamental value for greenhouses and probably also in S. Calif. and S. Fla. Yet little known in this country.

SÀGUS RÙFFIA: *Raphia.*

ST. JOHN'S-WORT: *Hypericum.*

SAINTPAÙLIA (from the discoverer of the plant, Baron Walter von Saint Paul). *Gesneriàceæ.* Hairy often stemless perennial herbs, used for greenhouse flowering, the blossoms providing an attractive blue.



3520. Saintpaulia ionantha.—A young plant just coming into bloom. (×½)

Leaves long-petioled, ovate: peduncles radical (or axillary in the caulescent species), 1–5 in. high, bearing several (or 1) fls. in a loose cyme: calyx small, deeply 5-lobed; corolla wide-campanulate, tube short, the lobes elliptic, blue; perfect stamens 2; ovary hairy: caps. oblong, loculicidally 2-valved; seeds small, ellipsoid.—Four species, Trop. Afr.

The end of March is a good time to propagate saintpaulias, when the ripened leaves should be cut off with about an inch of the stalk attached, and inserted in the sand-bed, covering only a small part of the leaf-blade. The sand should not be kept too wet during the process of rooting. Their propagation from seed and general culture is similar to that of gloxinia. The plants may be flowered the entire year or given a period of rest by partly withholding water. (G. W. Oliver.)

ionántha, Wendl. AFRICAN VIOLET. USAMBARA VIOLET. Fig. 3520. Stemless, hairy: lvs. many, 1½ in. long, ovate or subcordate, thin, regularly crenate, clad on both surfaces with many short and a few very long white hairs: peduncles 1–4 in. long, 1–6-fld.: calyx-lobes linear; corolla-lobes not very equal: caps. narrow-oblong. Trop. Afr. Gt. 42:1391 and p. 323. Gn. 47:133; 74, p. 103; 79, p. 13. G.M. 37:62; 55:97. G.C. III. 13:685. Gn.W. 25:345. G.W. 10, p. 343. R.H. 1893, p. 321. Var. **grandiflòra,** Hort., has much larger fls. than the type, the fls. intense violet. Var. **variegàta,** Hort., has the lvs. variegated with light yellow turning to white.

kewénsis, C. B. Clarke. Lvs. entire, with numerous long white hairs: calyx-lobes oblong-linear: caps. 2 or 3 times as broad as the preceding and more shaggy, white-hairy. Trop. Afr. B.M. 7408. R.B. 20:109 (both as *S. ionantha*).—Very closely related to *S. ionantha* and confused with it.

S. pusilla, Engler, and *S. Goetzeàna,* Engler, of German East Africa, appear not to be in cult. F. TRACY HUBBARD.

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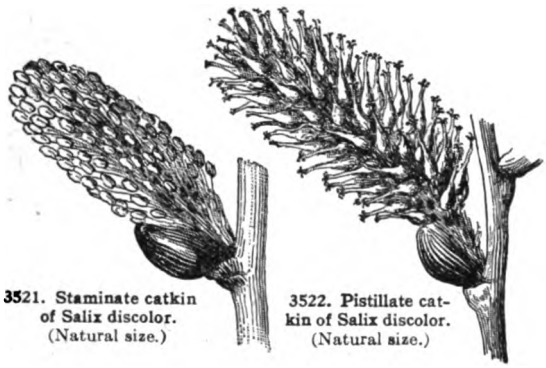
SALAD PLANTS are those with soft and edible leaves or stems, or both, that may be used raw or in the preparation of uncooked dishes.

The principal salad plant in America is lettuce, which is used exclusively, but not always expertly, for salads. For full directions for growing lettuce in the garden and under glass, see *Lettuce* and *Forcing*. Next to lettuce the best-known salad plant in this country



3521. Staminate catkin of Salix discolor. (Natural size.)

3522. Pistillate catkin of Salix discolor. (Natural size.)

is probably endive, which is excellent, especially when well-blanched plants are to be had in the winter. Chicory is much like endive, as regards its treatment either in the garden or in the salad-dish. Like endive, it is frequently seen in the larger city markets. The common dandelion should be mentioned in this category. When forced and blanched it makes a salad fit for the most cultivated epicure. For ordinary home cultivation and use, however, the common garden cress (*Lepidium sativum*, not water-cress, nor upland cress) ranks next to lettuce in value. Its rapid growth and high flavor equally recommend it. This plant is said to be a great favorite in English gardens and forcing-houses, where it is grown in mixture with white mustard and is pulled very young and eaten roots and all. Corn salad is another plant sometimes grown in gardens and used for salad-making. It is most acceptable to those who do not relish the pungency of mustard and cress. Chives is used by many persons as an ingredient of lettuce and other salads; also young onions. Many other plants are used in various places and by various persons for salads.

Besides the salad plants proper, many vegetables are used in a cooked or raw condition for salads. Such are cabbage, cauliflower, brussels sprouts, potatoes, lima beans, beets, Jerusalem artichoke, and the like. With salad plants may also be included pot-herbs, or "greens." The plants especially to be mentioned in this category are swiss chard, beet-tops, spinach, kale, endive, witloof and mustard. Many other plants find occasional or local favor. See *Greens*.

The only general cultural directions which can be given for salad plants are that blanching is often desirable and a quick unchecked growth is always a requisite. An abundance of rapidly available fertilizer and plenty of water are therefore to be insisted on. A warm light soil, in the best mechanical condition, is necessary for the same reasons.

F. A. WAUGH.

SALICÓRNIA (Latin, *salt* and *horn;* saline plants with horn-like branches). *Chenopodiàceæ*. GLASSWORT. MARSH SAMPHIRE. A group of about 12 widely scattered species of leafless seashore herbs, hardy or tender, annual or perennial. This and other chenopods which grow in large quantities in the Medit. region were formerly used in making soap and glass, as they yield a large percentage of soda. The ashes of such plants were known to the trade as barilla. The species have probably never been regularly in cult. and have no horticultural interest.

SALISBÙRIA: *Ginkgo*.

SÀLIX (ancient Latin name of willow). *Salicàceæ*. WILLOW. Dicecious trees and shrubs, planted for the foliage and interesting habit, for shade, screens, and cover; flowers in catkins, mostly in spring and in many species very early.

Erect, or some arctic and alpine species prostrate, glabrous, pubescent or tomentose: lvs. simple, alternate, mostly elongated and pointed, the stipules persistent and prominent or caducous: buds with a single bud-scale: fls. in lax scaly spikes (aments or catkins), each fl. subtended by a single entire scale and nearly or quite destitute of perianth; the staminate fl. with 1, 2, or 3–6 stamens; the pistillate fl. of a single pistil composed of 2 carpels and 2 more or less divided stigmas; at maturity the pistil dehisces, setting free the small appendaged seeds.—Species and species-like hybrids probably 300, widely spread in the northern hemisphere and a few in the southern hemisphere; no native species are reported in New Zeal. and Austral. In temperate regions, they are mostly plants of water-courses, shores, and swamps; but a good number run into the far N. and the high elevations where conditions of moisture are maintained. The wood is light, soft, and porous. For the staminate and pistillate fls. of willow, see Fig. 1528, Vol. III. The catkins or "pussies" are also shown in Figs. 3521 and 3522 herewith. In rare cases, a willow may be monœcious.

Many hybrids have been described based on specimens found in nature that presented characters intermediate between recognized species. Artificial hybrids have also been made between many species. The dicœcious habit of the species seems to facilitate cross-pollination, and it is probable that the intermediate forms so frequently met with and designated in the monographs as varieties are natural hybrids. Upward of one hundred hybrid willows have been described as

3523. White willow on a stream, holding the bank from washing. (See No. 7.)

growing in Europe. Although as many or even more species occur in America, fewer hybrids have been detected here. The hybrids described as growing in America are for the most part between native species and those introduced from Europe. Because of the hybridity and the fact that the sexes are separated, the genus Salix is considered to be very critical and difficult for the systematist.

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The rôle that the willow plays in the north temperate regions is to a certain extent analogous to that of the eucalyptus in subtropical regions; it flourishes in wet ground and absorbs and transpires immense quantities of water. It has been used to plant around cesspools for sanitary effect. But while most of the species occur spontaneously in wet ground or along stream-banks, the willows may be cultivated in various situations. The white willow (*S. alba*) has been used very effectively to fix stream-banks against erosion. (Figs. 3523, 3524.) Its root-system is very extensive and when well established withstands the effect of heavy rapid streams as well as wave-action. *S. arctica* and several allied species are among the few woody plants extending into extreme arctic regions. The arctic species are among the most diminutive of woody plants. As one goes south the species increase in size. Some of the species of North Temperate, Tropical and South Temperate zones are large trees. The arborescent species all form wood very rapidly. Specimens of white willow which may not be of great age look venerable from their great thickness of trunk and size of top. The wood is light in weight and color, finely and evenly porous. The wood has been extensively used in manufacture of gunpowder. It has also been used for many other purposes. Certain species have been extensively cultivated for many years in Europe for materials with which to manufacture baskets. *S. viminalis* appears to be the favorite species for this purpose. Basket willow is now extensively planted in central New York, and considerable manufacturing of this material is under way. It is probable that the Chinese and Japanese willows recently described will yield useful forms for American planting; in Plantæ Wilsonianæ, III, pt. 1, describing Chinese plants, Schneider admits regularly 183 species.

As ornamental trees the willows present little variety. The bright yellow catkins of some species are attractive in spring. They are considerably used as "nurse trees"

3524. Same tree as in Fig. 3523, in summer dress.

for slower-growing trees that require partial shade while young. The red and yellow branches of certain willows are very bright and cheering in winter. The weeping forms are very popular, but they are often planted with little sense of fitness. The cultural remarks under Populus will apply to willows.

The species of willows are readily propagated by cuttings. It has been suggested that the brittleness at base of twigs of some species, notably the black willow (*S. nigra*), is an adaptation to facilitate the natural distribution of the species. Certain it is that twigs broken from the tree by the wind are carried down streams and, becoming anchored in the muddy banks, grow readily. It is one of the most aggressive trees in occupying such places. Willows may also be propagated by seed. The

3525. Old roadside trees of Salix alba.

seeds are very small and contain a green and short-lived embryo. A very short exposure of the seeds to the air will so dry them out that they will not germinate. The safest way to secure seedlings is to plant the seeds as soon as the capsule opens.

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KEY TO THE SPECIES.

A. *Species of the usual upright kinds.*
B. *Scales of ament green, deciduous: mostly trees.*
C. *Stamens more than 3.*
D. *Foliage persistent* ..... 1. **Bonplandiana**
DD. *Foliage not persistent.*
E. *Buds small.*
F. *Lvs. green beneath* ..... 2. **nigra**
FF. *Lvs. glaucous beneath* ..... 3. **amygdaloides**
EE. *Buds large: lvs. very shiny above* ..... 4. **lucida**
5. **pentandra**
CC. *Stamens 2 or 3.*
D. *Large trees* ..... 6. **fragilis**
7. **alba**
8. **vitellina**
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12. **elegantissima**
13. **Safsaf**
DD. *Shrubs* ..... 14. **longifolia**
15. **argophylla**
16. **balsamifera**

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BB. *Scales of ament black above, persistent: mostly shrubs.*
C. *Stamens 2.*
D. *Caps. hairy*.....17. **Caprea**
18. **discolor**
19. **rostrata**
20. **humilis**
21. **tristis**
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23. **petiolaris**
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DD. *Caps. glabrous*.....26. **myrtilloides**
27. **cordata**
28. **irrorata**
29. **incana**
CC. *Stamen 1*.....30. **purpurea**
31. **sitchensis**
AA. *Species of the arctic-alpine kinds: dwarf often prostrate shrubs*.....32. **Cottetii**
33. **herbacea**
34. **myrsinites**
35. **pyrenaica**
36. **repens**
37. **reticulata**
38. **retusa**

1. **Bonplandiàna,** Kunth. A branching shrub or low tree with coriaceous lvs. 5–6 in. long, dark green above and glaucous beneath: aments usually precocious in the axils of mature lvs. Native of Mex. and the S. W. U. S.

2. **nìgra,** Marsh. BLACK WILLOW. Fig. 3526. Tree, 30–40 ft. high: bark flaky, often becoming shaggy: twigs brittle at base: buds small: lvs. lanceolate, green both sides, finely and evenly serrate: aments 1–2 in. long; scales oblong, deciduous; stamens 3–6; ovary ovate-conical, glabrous; style short but distinct. E. N. Amer. Var. **falcàta,** Pursh. Lvs. elongated, narrow and falcate.

3. **amygdaloides,** Anders. PEACH-LEAF WILLOW. Tree, 30–40 ft. high: bark longitudinally furrowed, less inclined to be flaky: lvs. broader, glaucous beneath, on rather long, compressed petioles: aments loosely fld.; ovary lanceolate-conical; style very short. Cent. and W. N. Amer.

4. **lùcida,** Muhl. Shrub or low bushy tree, 6–15 ft. high: branches yellowish brown and highly polished: buds large, flattened, and recurved at the apex: lvs. large, broadly lanceolate-acuminate, serrate, dark green, shining above: aments large, appearing with the lvs.; scale pale green, deciduous; stamens 4–5; ovary pedicelled, rather obtuse, glabrous. E. N. Amer.—A beautiful plant, deserving of more extensive cult.

5. **pentándra,** Linn. (*S. laurifòlia,* Hort. *S. Humboldtiàna,* Hort. not Willd.). BAY-LEAF or LAUREL-LEAF WILLOW. Shrub or small tree, 8–20 ft. high: branches chestnut-color: lvs. large, elliptic to broadly oblanceolate, acuminate, shining and dark green above, paler beneath: aments appearing after many of the lvs. are fully developed, not conspicuous. Eu. and Asia.

6. **frágilis,** Linn. (*S. víridis,* Fries. *S. Russelliàna,* Smith). BRITTLE WILLOW. Fig. 3526. Tree, 50–60 ft. high, excurrent in habit and of very rapid growth: branches brown, obliquely ascending: buds medium size, pointed: lvs. large, lanceolate-acuminate, glabrous or slightly hairy when young, scarcely paler beneath, glandular serrate: aments appearing with the lvs. (the staminate tree rare in Amer.), seldom bearing good seed, slender; scales deciduous. Eu., N. Asia. Gn. 19, p. 517; 55, p. 89.—Frequently cult. and also growing spontaneously in many places. A company of promoters induced many American farmers to plant hedges of this willow some 50 years ago. Many of these occur now throughout the country, the trees being 40–50 ft. high. A stake cut from a tree and driven in the ground will soon establish itself and grow into a tree. Var. **decípiens,** Hoffm. Twigs yellow: buds black in winter: lvs. smaller and brighter green. Probably a hybrid with another species.

3526. Leaves of willow. *1*, Salix petiolaris; *2*, S. candida; *3*, S. purpurea; *4*, S. myrtilloides; *5*, S. nigra; *6*, S. fragilis. (×½)

7. **álba,** Linn. WHITE WILLOW. Fig. 3527; also Figs. 3523–3525. Large tree, with short and thick trunk, not excurrent in habit: branches yellowish brown: lvs. ashy gray and silky throughout, giving a white appearance to the whole tree, 2–4 in. long, elliptical. Eu. Gn. 55, p. 87; 61, p. 7.—Heretofore associated with the next species, from which it differs in color of twigs and vesture and color of lvs., as also in its general habit. It is only occasionally seen in Amer. Var. **splèndens,** Anderss. (*S. álba* var. *argéntea,* Wimm. *S. regàlis,* Hort.). Lvs. densely silky on both sides, nearly silvery-white while young. The forms of this species not easily distinguishable from one another, can be readily distinguished from the following species.

8. **vitellìna,** Linn. (*S. blánda,* Anderss.). YELLOW WILLOW. Becoming a very large and venerable appearing tree, the rather short trunk often 4 ft. or more in diam. It is often pollarded. The crown is deliquescent and rounded in outline. Branches yellow: lvs. silky-hairy when young, glabrous when mature, glaucous beneath, the whiteness intensified after the lvs. fall: aments appearing with the lvs. Abundant in E. N. Amer. Mn. 8, p. 25 (erroneously as *S. alba*).—Displaying many variations, the most obvious of which are: Var. **aùrea,** Salisb. (var. *aurantìaca,* Hort.), branches golden yellow, especially just before the lvs. appear in spring. Var. **britzénsis,** Hort., bark red. These as well as other choice varieties are grafted. Var. **péndula,** Hort. (*S. aùrea péndula,* Hort. *S. álba* var. *vitellìna péndula,* Rehd. *S. babylónica aùrea* and *S. babylónica ramùlis aùreis,* Hort.). Tree of weeping habit, similar to *S. babylonica,* with yellow branches. M.D.G. 1898:88. Gn. 55, pp. 15, 22. S.H. 2:361, 371.

9. **babylónica,** Linn. (*S. péndula,* Moench). NAPOLEON'S WILLOW. Fig. 3527. A tree of weeping habit, 30–40 ft. high, with long slender olive-green or purplish branches: buds small, acute: lvs. 2–6 in. long, attenuate at base and apex: aments appearing with the lvs., slender, the pistillate green, 1 in. long, caps. small. China. Gn. 1, p. 371; 34, p. 527; 39, p. 73; 55, p. 92. S.H. 1:261. F.E. 19:574. G.W. 2, p. 31.—Long known in cult. and often grown in cemeteries. Tender N. Var. **annulàris,** Forbes, lvs. twisted back so as to form a sort of ring.

10. **Salamònii,** Carr. (*S. babylónica* var. *Salamònii,* Carr.; sometimes erroneously spelled *Salomonii* or *Salmonii*). Hybrid between *S. alba* and *S. babylonica.* Similar to *S. babylonica,* but less pendulous: tree with ascending branches and pendulous branchlets: lvs. similar to those of *S. babylonica,* but sparingly silky-pubescent on both sides: pistillate catkins with more pubescent

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axis and long-ciliate scabs. Originated in France. M.D.G. 1898:89. Gn. 55, p. 19. S.H. 2:373.—Probably *S. sepulcrâlis*, Simonkai, belongs here.

11. **blânda,** Anderss. (*S. Pètzoldii*, Hort. *S. babylónica* var. *dolorôsa*, Rowen; possibly also *S. pendulîna*). Wisconsin Weeping Willow. A hybrid of *S. babylonica* and *S. fragilis*. Tree with spreading limbs and pendulous branches; branches brownish green or brown: lvs. lanceolate or narrow-lanceolate, long-acuminate, serrulate, glabrous, dark green above, glaucous beneath, 3–6 in. long and ⅛–¾in. broad: fls. with the lvs.; stamens 2; ovary short-stalked, glabrous, with one gland at the base, half as long as the pedicel. Of garden origin.

12. **elegantíssima,** Koch (*S. Sièboldii*, Hort.). Thurlow's Weeping Willow. Tree with more spreading habit and larger crown than *S. babylonica:* branches long and pendent, yellowish green, sometimes blotched with brown: appears to be more hardy than *S. babylonica*. Origin unknown. M.D.G. 1898:88. Gn. 55, p. 24. S.H. 2:363.—Said to be of Japanese origin; probably only a form of *S. blanda*.

13. **Sâfsaf,** Forsk. Egyptian Willow. A tree in general appearance like *S. alba* or *S. babylonica*. Several varieties have been described. The mature lvs. are bright green above and glaucous beneath, 3–5 in. long and over ½in. wide. N. E. Afr., where it is frequently cult. along highways.—Intro. into Italy many years ago.

14. **longifôlia,** Muhl. (*S. rùbra*, Rich., not Huds. *S. intèrior*, Rowlee. *S. fluviâtilis*, Sarg., and other recent authors in part, not Nutt.). Fig. 3527. Varying in stature from a low shrub to a small tree, usually growing along streams and lake-shores: twigs smooth and brown to densely tomentose and gray: buds plano-convex, with an obtuse and rounded apex, very small: lvs. nearly or quite smooth, sparsely canescent to extremely canescent, sessile, linear-elliptical, remotely dentate, the teeth narrow, sometimes quite spinulose: stipules conspicuous, ear-shaped, obscurely denticulate, deciduous: aments of late spring on short lateral peduncles, which bear 4–6 lvs., those borne later in the season on much longer leafy branches, very loosely fld.: fls. fascicled in clusters of 2–5 on the axis, a distinct interval between the fascicles, first appearing in May and often bearing a second set of aments in early summer; scales usually glabrous or somewhat hairy toward the base, narrowly oblong, yellowish, deciduous after flowering; filaments crisp-hairy below, smooth above: caps. sessile, clothed when young with appressed silvery hairs, becoming nearly smooth at maturity; stigmas short, sessile. Cent. N. Amer.—The pistillate ament, lax at anthesis, becomes more so as the caps. mature, and by this character the species can easily be distinguished from related species.

15. **argophýlla,** Nutt. (*S. longifôlia* var. *argophýlla*, Anders. *S. fluviâtilis* var. *argophýlla*, Sarg. *S. Hindsiâna*, Benth.). Tree or large shrub, 12–18 ft. high, forming dense thickets but not growing in clumps: branches nearly glabrous and exceedingly tough: bark turning from brown to bright yellow or orange just before blooming, making a thicket of it a most conspicuous object: lvs. narrowly lanceolate, closely sessile, entirely or rarely minutely and remotely denticulate, clothed equally on both sides with an appressed silky pubescence, which more or less conceals the veins; stipules obsolete: scales oblong and obtuse in the staminate ament, narrower and more acute in the pistillate; lower half of the filament densely crispy hairy: caps. lanceolate, covered with straight appressed silky hairs, closely sessile; stigmas sessile; mature caps. often nearly glabrous.—Occasionally the lvs. remain upon the plant over winter, the young shoots appearing in their axils in spring. Ament surpassed in length by its leafy peduncles; appearing in May in Ore. and N. Calif. and flowering intermittently all summer. This species is distinguished by its narrowly lanceolate, entire lvs., obsolete stipules, small and rather narrow aments, erose scales, and hairy caps. *S. argophylla* occurs on the Pacific slope from S. Calif. to Brit. Col. It is a western representative of the long-lvd. willows. Not advertised, but a beautiful species common along streams and irrigation ditches.

3527. Leaves of willows. *7*, Salix alba; *8*, S. babylonica; *9*, S. longifolia; *10*, S. rostrata; *11*, S. tristis; *12*, S. discolor. (×½)

16. **balsamífera,** Barr. Fig. 3528. A much-branched clean-looking shrub, with shining colored twigs, sometimes almost tree-like: glabrous: lvs. short-oval to lance-oblong, rounded and sometimes somewhat cordate at base, glandular-serrulate, thinnish and fragrant, dark green above and pale or glaucous and also prominently reticulate beneath: fertile aments becoming lax and open, the slender pedicels of the carpels much longer than the glands, the style short. Along the northern borders of the U. S. and far northward; an attractive species. G.F. 6:29 (reduced in Fig. 3528).

17. **Cáprea,** Linn. Goat Willow. Fig. 3529. A small tree, 12–25 ft. high, with upright branches: lvs. large, 2–5 in. long, 1–3 in. wide, rounded or subcordate at base, rugose, very variable: aments appearing before the lvs., large and showy, especially the staminate ones. Eu., Asia.—The typical form often occurs in yards where it has sprouted from the stock upon which the more popular but scarcely more ornamental variety, *pendula*, has been grafted. Var. **péndula,** Hort. Kilmarnock Willow. Dwarfed form, grafted on stock about 4 ft. high, and forming a weeping shrub. Often planted in yards. *S. multinérvis* is supposed to be a hybrid, and probably belongs with *S. Caprea*. *S. Cáprea* var. *tricolor*, Hort., is said by F. W. Kelsey to be a round-headed tree, with "tricolored foliage;" probably a form of *S. aurita*. *S. palmæfôlia*, Hort., is said by F. W. Kelsey to be of vigorous growth, with large, deep green lvs. and reddish purple young wood.

18. **díscolor,** Muhl. Pussy Willow. Figs. 3521, 3522, 3527. A shrub or short-trunked tree, 10–20 ft. high: buds very large and nearly black: lvs. smooth and bright green above, whitish beneath, irregularly crenate-serrate: aments appear early in spring, before the lvs., closely sessile, enveloped in long, silky hairs. E. N. Amer.—Worthy of more extended cult. and thriving in dry ground.

19. **rostràta,** Rich. (*P. Bebbiâna*, Sarg.). Fig. 3527. A small tree, 10–20 ft. high, with short but distinct trunk: buds of medium size, conical, brown: lvs. dull green and downy above, prominently veined and hairy beneath: aments appearing with the lvs., the staminate beautiful golden when in flower; scales narrow

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and shorter than the pedicels: caps. long-rostrate. E. N. Amer.—Prefers dry soil and can be used to good advantage against walls and in rockeries.

20. **humilis,** Marsh. PRAIRIE WILLOW. A shrub, 3–8 ft. high, varying much in stature, and in size and shape of lvs.: branches hairy: lvs. oblanceolate to oblong, nearly entire, more or less revolute: aments densely and many-fld. E. N. Amer.—Grows in driest situations.

21. **tristis,** Ait. DWARF WILLOW. Fig. 3527. A diffuse shrub, 1–1½ ft., with long deep-set root: branches gray, slender: lvs. small, 1 in. long, linear-lanceolate, very short-petioled: aments small and rather few-fld.; stamens orange-red. E. N. Amer.

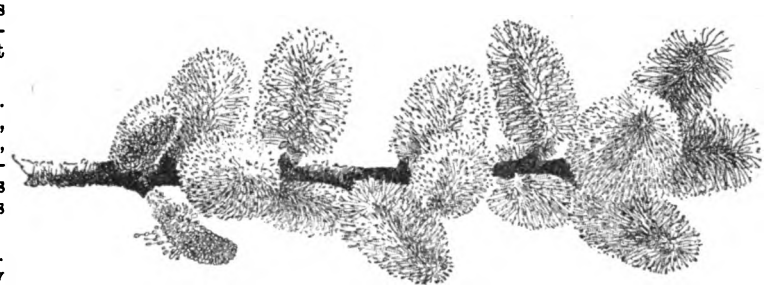
22. **sericea,** Marsh. SILKY WILLOW. A shrub usually 4–8 ft. high, diffusely spreading from base: branches often reddish: buds obtuse and rounded at apex, cylindrical: lvs. very silky beneath, sometimes becoming less so at maturity: aments densely fld., appearing with the lvs.; stamens often orange-red: caps. short-pedicelled, ovate-oblong, nearly truncate at apex. N. E. N. Amer.

23. **petiolaris,** Smith, not Hort. Fig. 3526. A low shrub, 3–5 ft. high: branches slender, the whole plant much slenderer than *S. sericea*, with which it frequently grows: buds smaller and more pointed: lvs. only slightly silky when young, soon glabrous, more evidently toothed: aments rather loosely fld.: caps. rostrate and pointed, distinctly pedicelled. Cent. and N. E. N. Amer.—*S. petiolaris* of the trade is *S. incana*.

24. **viminalis,** Linn. OSIER WILLOW. A shrub or small tree, 10–20 ft. high: branches slender and straight: lvs. linear-lanceolate, beautifully silvery, 4–10 in. long; margins revolute, entire: aments appearing before the lvs., golden yellow. Eu., Asia.—Most often seen in plantations for basket material, for the production of which the plants are cut near the ground every year. Willow-culture in experienced hands is often profitable. (For details, see Simpson, Osier Culture, Bull. 19, Div. of For., U. S. Dept. Agric. 1898.) This species does not thrive in this country as well as in Eu.

3528. Salix balsamifera. (×½)

25. **candida,** Fluegge. HOARY WILLOW. Fig. 3526. A shrub, 2–5 ft. high: young branches hoary, becoming smooth and red with age: buds reddish, rounded at the apex: lvs. lanceolate or linear-lanceolate, 2–4 in. long, dark green and wrinkled above, covered below with dense white tomentum, revolute: aments sessile, appearing before the lvs.; staminate of reddish anthers: caps. densely white-woolly, with red style and stigmas. N. Amer.—This species hybridizes freely with *S. cordata*, and several natural hybrids have been described.



3529. Staminate catkins of goat willow.—Salix Caprea (×½). No. 17.

26. **myrtilloides,** Linn. Fig. 3526. A shrub, 2–5 ft. high, with rather slender brown twigs: lvs. oblong or elliptic-obovate, usually obtuse at both ends, entire and smooth, reticulate-veined: aments rather few-fld.: caps. reddish, glabrous. N. E. N. Amer. and Eu. Usually grows in cold peat-bogs.—Probably not in cult. The plant sold under this name is probably some form of *S. purpurea*, which *S. myrtilloides* closely resembles in general appearance.

27. **cordata,** Muhl. (*S. rigida*, Muhl.). HEART-LEAVED WILLOW. Fig. 3530. A large shrub or small tree, 10–30 ft. high: branches stout: buds large, flattened against the branch: lvs. oblong-lanceolate, green on both sides, finely serrate, glabrous and rather rigid at maturity: aments rather slender, appearing with the lvs.: caps. glabrous, greenish or brownish. N. Amer.—This is a variable species and undoubtedly some of the forms included in it are hybrids; several supposed natural hybrids have been described. Var. **pendula,** Hort., is a decumbent form.

28. **irrorata,** Anders. COLORADO WILLOW. A dense diffuse shrub, 8–12 ft. high: branches stout, covered with a white bloom: buds large: lvs. linear-lanceolate, 3–4 in. long, ½in. wide, green above, glaucous beneath, undulate serrate: aments all appearing before the lvs., sessile, very densely fld.; staminate golden yellow: caps. glabrous, nearly sessile. Rocky Mts.

29. **incana,** Schrank (*S. petiolaris*, and *S. rosmarinifolia* of American gardeners, but not of botanists). Shrub or small round-topped tree, with long, slender branches: lvs. linear, revolute, 2–5 in. long, very narrow, green above, white-tomentose beneath: aments long and slender, appearing with the lvs.: caps. glabrous; filaments of stamens more or less connate. Eu.—This species is frequently grafted upon hardy stock (*S. Caprea*) when sold from nurseries.

30. **purpurea,** Linn. (*S. Forbyana*, Smith. *Vetrix purpurea*, Rafin.). PURPLE OSIER. Fig. 3526. A shrub or small tree, spreading at base, with long, flexible branches: lvs. oblanceolate, serrulate, glabrous, veiny, 3–6 in. long, often appearing opposite: aments sessile, slender; pistillate recurved; scales purple; stamen 1: caps. small, ovate. Eu.—Planted as an ornamental shrub and escaped in many places. Also grown as a basket-willow. Var. **pendula,** Dipp. (*S. nigra pendula*, Hort. *S. americana pendula*, Hort.). Branches pendent. Gng. 4:243.

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31. **sitchénsis,** Sans. SITKA WILLOW. A shrub, 10–12 ft. high and more: lvs. obovate, glabrous, clothed beneath with silky hairs which have a beautiful satiny luster: aments appearing with lvs., long, cylindrical and graceful, also satiny. N. W. N. Amer.—This willow, which, so far as known, has not been used as an ornamental plant, is one that would be at once novel and beautiful. The characteristic luster of the lvs. is preserved in plants in cult.

3530. Leaves of Salix cordata showing stipules. (×⅓)

32. **Cottêtii,** Kerner. A low shrub differing from *S. retusa* mainly in the larger size of the whole plant as well as its lvs. Cent. Eu. G.W. 9, p. 542.

33. **herbàcea,** Linn. A very dwarf species usually not more than an inch or so in height, forming dense mats: lvs. orbicular, serrate, usually emarginate at both base and apex. Alpine regions of Amer. and Eurasia, White Mts., N. H.

34. **myrsinîtes,** Linn. (*S. Jácquinii,* Host). An alpine shrub a foot or less high, either erect or more or less creeping: lvs. short-petioled, lanceolate, coriaceous, shining, green both sides. Arctic and alpine regions.

35. **pyrenàica,** Gouan. A dwarf caulescent shrub usually more or less depressed in habit, with slender brown shining twigs: lvs. membranous, about 1 in. long and half as wide, entire, ciliate on the margin. In the alpine regions of the Pyrenees.

36. **rèpens,** Linn. A shrub of variable stature and vesture: lvs. oval to linear, entire or remotely serrulate, shining above, silver-silky or glabrous beneath, stipules wanting. N. Eu. and Asia. Var. **argéntea** has silvery-silky lvs. G.L. 22:325.

37. **reticulàta,** Linn. A depressed shrub with few oval or orbicular lvs. glaucous beneath, green above, rugose-reticulate: aments slender, borne on a long peduncle. Arctic regions of both hemispheres.

38. **retûsa,** Linn. (*S. serpyllifò'ia,* Scop.). A depressed shrub: lvs. characteristically "parallel"-veined, obtuse or slightly retuse at the apex, entire, less than ½in. wide. Alpine regions of Eu. and Asia.

S. aglàia, Hort.=S. daphnoides.—*S. amygdàlina,* Linn. (S. triandra, Linn.). Usually shrubby, to 12 ft.: branchlets glabrous, rarely slightly silky: lvs. lanceolate, glabrous, pale green or bluish below, to 5 in. long: fls. shortly before or with the lvs.; stamens 3; ovary long-stalked, glabrous. Eu.—*S. Bàkeri,* Seemen, is probably a form of S. lasiolepis.—*S. Bóckii,* Von Seemen. An ornamental dwarf species: lvs. oblong or oval, ¼–½in. long, mucronate, dark green and glabrescent above, silvery with silky appressed hairs beneath: aments 1–2 in. long, produced in Oct. and Nov. before the fall of the lvs. China.—*S. chrysócoma,* Dode, is a hybrid between S. babylonica and S. vitellina.—*S. daphnoides,* Vill. Ten to 20 ft. high: twigs violet: lvs. narrow-oblong or linear-lanceolate, very acuminate, 3–6 in. long.—*S. Hánkensonii,* Dode. Apparently a natural hybrid between a species of the group of S. nigra and one of the group of S. babylonica.—*S. heterándra,* Dode. Possibly hybrid between a species of the S. purpurea group and one allied to S. pentandra. Shrub: lvs. lanceolate-obovate or narrowly lanceolate, 3–4 in. long, remotely serrate, glabrous, light green above, whitish-glaucous beneath: male aments about 1¾ in. long: Caucasus.—*S. hypoleùca,* Seemen. Shrub, to 10 ft.: lvs. elliptic to lanceolate, acute, glabrous at maturity, glaucous below, 1–2 in. long: aments with the lvs. 1–2 in. long. Cent. W. China.—*S. japónica,* Thunb. (S. babylonica var. japonica, Anderss.). Shrub, to 6 ft.: lvs. ovate-oblong to lanceolate, remotely serrate, glabrous, grayish green beneath, to 3 in. long: aments slender, 2½–3½ in. long; ovary glabrous. Japan.—*S. lasiólepis,* Benth. ARROYO WILLOW. Shrub or tree, 9–25 ft. high: lvs. oblong, suborbicular, obovate or linear acute, obscurely serrulate, 1½–5 in. long: aments appearing before the lvs., sessile, densely silky-tomentose in the bud, suberect: caps. glabrous or puberulent, short-pedicelled. Calif.—*S. lispoclàdus,* Dode. Lvs. ovate-lanceolate, about 2½ in. long, serrate, light green and shining above, whitish glaucous beneath: male aments appearing late. Caucasus.—*S. magnífica,* Hemsl. Shrub, to 20 ft.: lvs. oval to obovate, shortly and obtusely acuminate, glabrous, pale beneath, to 8 in. long and to 5 in. wide; petiole purplish: staminate aments to 7 in., pistillate to 11 in. long. W. China. A remarkable willow, but tender N. J. H.S. 39, p. 137, fig. 148.—*S. Matsudàna,* Koidzumi (S. babylonica var. pekinensis, Henry). Tree, to 40 ft.: branchlets ascending or pendulous, greenish: lvs. narrowly lanceolate, serrulate, glabrous, 2–4 in. long: aments with the lvs., about ½in. long. N. E. Asia.—*S. Medèmii,* Boiss., of the Armenia-Persia region is an upright species 12 ft. and more high with oblong somewhat serrate lvs. abruptly pointed.—*S. Médwedewii,* Dode. Shrub or small tree: lvs. very narrow, up to 4 in. long: female aments appearing late, cylindric, 1¼ in. long. Caucasus.—*P. órica,* Dode. Lvs. large, glaucescent, giving the tree a bluish appearance. Cent. Asia.—*S. pérsica,* Boiss. Similar to P. babylonica. Trunk pale ashy gray or brownish: lvs. very shortly stalked, somewhat falcate, long-acuminate, serrulate. Persia.—*S. Rehderiàna,* Schneid. Shrub, to 10 ft.: branchlets sparingly hairy or glabrous: lvs. lanceolate, crenulate, whitish and silky beneath, with yellow midrib, 2–5 in. long: aments precocious, about 1 in. long; anthers purple at first; ovaries glabrous. W. China.—*S. renèria* is a hybrid, of which S. cinerea is a parent.—*S. Tóminii,* Dode. Tree with spreading branches: lvs. obovate to lanceolate, 3½–4 in. long or more, remotely serrate: male aments at first conical and rosy at apex, afterward ovate-cylindric, ¾in. long. W. Asia.—*S. triándra,* Linn.=S. amygdalina.—*S. Wallichiàna,* Anderss. Shrub or small tree: lvs. ovate- to oblong-lanceolate, entire, silky beneath like the young branchlets, 2–3 in. long: staminate aments 1 in. long, pistillate 3–5 in.: caps slender, silky. Himayalas, Cent. and W. China.—*S. xygostèmon,* Hook. f. & Thom. Probably a natural hybrid between S. purpurea and S. Medemii.—*S. Wéntworthii,* Hort., is described as a tall upright rapid-growing willow with bright red bark: botanical position to be determined.

W. W. ROWLEE.

SALPICHRÒA (Greek, *tube* and *skin;* in reference to the form and texture of the flower). Syn. *Salpichròma. Solanàceæ.* Shrubs, subshrubs, or herbs, sometimes grown in the warmhouse and now used for outdoor planting in southern California.

Leaves often small, entire, long-petioled: fls. white or yellow, 2–3 in. long (Section Eusalpichroa) or only about ½in. long (Section Perizoma); calyx tubular or short, 5-cleft or -parted, the lobes linear; corolla tubular or urn-shaped, without a crown in the throat; lobes 5, acute, often short induplicate-valvate: berry ovoid or oblong, 2-celled; seeds numerous, compressed.—About 10 species, extra-trop. S. Amer. The species described below is said to have the advantage of being an exceedingly rapid climber, covering walls within one season with a thick mass of foliage and will thrive in alkali soil and under intense heat. The small white berries are sold everywhere in Paraguay as "cock's eggs." It grows with astonishing rapidity from the fleshy roots, which, however, are destroyed by frost. If black scale secures a foothold, it is well to cut the plant down to the roots.

rhomboídea, Miers (*Salpichròma rhomboídeum,* Miers). A half-hardy climber, somewhat woody, with green, flexuous branches: lvs. small (blade ½–¾in. long), ovate-rhomboid: fls. small, usually less than ½in. long, solitary, nodding, white; corolla short, constricted at the middle and at the throat, and bearing on the inside a fleshy, woolly ring: berry ovate-oblong, yellowish or white, edible, but of poor flavor. Argentina. G.C III. 24:450. R. H. 1897:531. Gn. 35, p. 367. F.E. 32:448.—The plant appears to be offered as *Withania origanifolia,* although the genus Withania itself has good standing.

F. W. BARCLAY.

3531. Salpiglossis sinuata. (×½)

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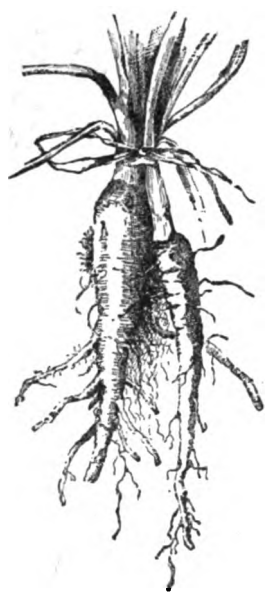
SALPIGLÓSSIS (Greek, *tube* and *tongue;* alluding to the form of the corolla and the appearance of the style). *Solanàceæ.* Viscous-pubescent half-hardy annual, biennial, or perennial herbs, chiefly used for garden flowers, but sometimes also grown in the greenhouse; of rich and attractive colors.

Plants about 18 in. high, erect, covered with short glandular hairs: lvs. entire, wavy-margined, dentate or pinnatifid: fls. long-stemmed, large, funnel-shaped, ranging in color from various shades of purple and blue through numerous reds and yellows to creamy white, and usually beautifully marbled and penciled with several colors; calyx tubular, 5-cleft, corolla funnelform, widely bell-shaped at the throat; lobes 5, plicate, emarginate; stamens 4, didynamous: caps. oblong or ovoid; valves 2-cleft.—About 8 species, natives of Chile.

The usual species in cultivation is *S. sinuata*, which was formerly divided into about 6 species mainly on the color of the flowers. *S. sinuata* has greatly improved in size of flowers and range of color until it is at the present time amongst the very finest half-hardy annuals. The varieties of salpiglossis require the general treatment given half-hardy annuals. They prefer a deep light rich soil not given to sudden extremes of moisture and dryness. The seeds may be sown indoors by the middle of March or later, or may be sown outdoors in early spring. Care must be taken that the early sown plants do not become stunted before being planted out. They bloom for several weeks in late summer. The flowers are useful for cutting and last well. The plant is also excellent as a greenhouse annual for late winter bloom. Seeds for this purpose may be sown in late summer. (F. W. Barclay.)



3532. Salsify or vegetable oyster. (×⅛)

sinuàta, Ruiz and Pav. (*S. variàbilis,* Hort. *S. Barclayàna,* Sweet. *S. hybrida,* Hort. *S. grandiflòra,* Hort.). Fig. 3531. Hardy annual, 1–2 ft. high, suberect, branched, sticky-pubescent, with fls. 2 in. long and wide, ranging from straw-color and yellow through scarlet nearly to blue, with great variation in venation and markings: lower lvs. petiolate, elliptic-oblong, wavy-toothed or pinnately cut; upper lvs. more nearly entire: bracts sessile, entire. Vars. **azûrea, aûrea, coccínea, pûmila, nàna,** Hort., are offered. V. 23:129. Gn. 29:166; 40, p. 75. R.H. 1849:361. G. 14:269. Gn.W. 22:659; 25:586. J.F. 4:395. Var. **superbíssima,** Hort., has a more columnar manner of growth with a thick, unbranched stem. G.C. III. 22:363. A.G. 18:860.

S. atropurpùrea, Graham. St. procumbent at base, then erect, about 2 ft. high: lvs. scattered, various in shape, lanceolate-elliptical, elliptical, or ovate-elliptical, flaccid, sinuated, the segms. generally blunt and entire: fls. deep rich purple on rather long pedicels. Chile. B.M. 2811. Included in S. sinuata by many authorities.—*S. stramínea,* Hook. (S. picta, Sweet. S. straminea var. picta, Hook.). Included in S. sinuata by many authorities from which it differs in the color of the corolla, which is whitish tinted yellow at the throat and often purple-veined. The top of the style of S. straminea is toothless while that of S. sinuata is toothed. Chile. B.M. 3365. Probably not in the trade.

F. Tracy Hubbard.†

SALPÍNGA (Greek, *trumpet,* referring to the shape of the calyx). *Melastomàceæ.* Erect glabrous branching herbs, including the warmhouse foliage plant known to the trade as *Bertolonia margaritacea.*

Leaves often unequal, oblong or lanceolate, long-petioled, under surface plum-colored: fls. spicate, on terminal, simple or dichotomously branched peduncles, secund, sessile or pedicellate; calyx glabrous, tube tubular or campanulate, 10-ribbed, the lobes short, tuberculate outside; petals 5, oblong or obovate; stamens 10; ovary free, oblong, 3-celled: caps. 3-edged, included in the terete, thickened, ribbed calyx.—Four species, Guiana, Brazil, and Peru.

margaritàcea, Triana (*Bertolònia margaritàcea,* Hort. Bull. *Gravèsia guttàta* var. *margaritàcea,* Nichols.). Tender perennial herb: st. 1½–4 in. high, erect, obtusely 4-angled, simple: lvs. long-petiolate, thin-membranaceous, ovate, base rounded or frequently distinctly emarginate-cordate, upper surface dark dull green, white-spotted between the veins, lower surface pale green, reddish or bright rose: cymes terminal, slender-branched, the branches red, rather long; fls. white or sometimes whitish rose; calyx-tube purplish, 10-ribbed, the ribs red; segms. green with pink tips; petals erect or erect-spreading, acute or rather obtuse: caps. pale, obscurely 3-sided. Brazil. F.S. 16:1697.

S. longifòlia, Triana (Bertolonia longifolia, Cham.). St. short, herbaceous: lvs. oblong, rarely ovate-oblong, base rounded or slightly cordate, upper surface bright green, glabrous, lower surface paler, scurfy-pubescent: cymes terminal; fls. white: caps. pale, 3-sided. Brazil.—*S. secùnda,* Schrank & Mart. St. subshrubby, erect: lvs. narrow-ovate or ovate-oblong, base rather obtuse or short-alternate, upper surface light green, lower surface paler: cymes terminal and axillary; fls. unknown: caps. pale red-brown, narrowly oblong, subcylindrical. Brazil.

F. Tracy Hubbard.

SALSIFY (formerly sometimes spelled *salsafy*) is *Tragopogon porrifolius,* one of the Compositæ. Fig. 3532. A garden esculent, grown for the fleshy root. This root has the flavor of oysters, hence the plant is sometimes called vegetable oyster and oyster plant.

Salsify is perfectly hardy. The seeds (which are really fruits) are sown in early spring, about as soon as the soil can be prepared, in drills where the plants are to stand. The drills may be 2 to 3 feet apart, if tilled by light horse-tools, or half that distance if tilled only by hand. In the rows, the plants are thinned to stand 3 to 6 inches apart. The plant requires the entire season, in the North, in which to grow. The roots may be allowed to remain in the ground until spring, for freezing does not harm them. In fact, they are usually better for being left in the ground, because they do not shrivel and become tough as they often do in storage. If they are kept cool and moist in storage, however, the quality is as good as when the roots remain in the ground. At least a part of the crop should be stored, for the table or the market during winter and early spring.

The plant is biennial. The second spring, a strong stalk 2 to 3 feet tall is sent up from the crown of the root, and in spring or early summer an abundance of light purple flower-heads are produced. The flowers, or heads, close about noon. The leaves are long, linear, and grass-like. The roots are small, well-grown specimens being about 1 foot long and unbranched, and about 2 inches in diameter at the top. The skin is grayish white. Salsify is easy to grow, and it has no serious pests. It is a vegetable of secondary importance commercially, although it should be in every home-garden, particularly in the North, where it thrives best. Eight to ten pounds of seed is sown to the acre. There are few varieties, and these have no marked characteristics except in size. The Mammoth Sandwich Island and Improved French are probably the best varieties. Salsify is native to southern Europe. In some places it has escaped as a weed. See *Tragopogon.*

Black salsify is Scorzonera; Spanish salsify is Scolymus.

L. H. B.

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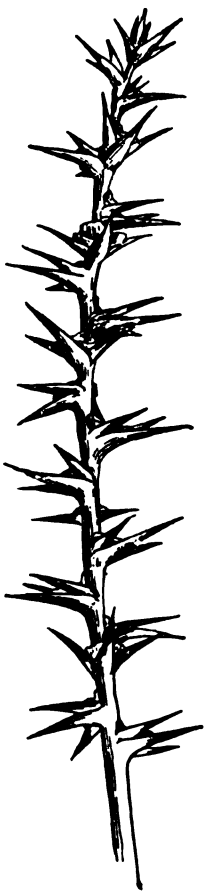
SÁLSOLA (Latin, *salsus*, salty; the plants grow in salty places). *Chenopodiàceæ*. Weedy annual and perennial branching herbaceous plants of some 50 species of very wide distribution, mostly on seashores and in saline soils, of no horticultural interest. Lvs. narrow, usually awl-shaped or long-pointed, commonly fleshy: fls. very small, sessile in the axils (Fig. 3533), perfect, provided with 2 bractlets; calyx 5-parted, the segms. winged on the back; petals 0; stamens usually 5; styles 2: fr. a flattened utricle, with a horizontal seed. Of interest because it includes the Russian thistle, *S. Kàli*, Linn., var. *tenuifòlia*, Mey. (*S. péstifer*, Nels.), now a widespread weed along railway rights of way and very abundant in the prairie and plains regions; of relatively recent intro. from Eurasia. With good tillage and short rotations it is not to be feared; when young or growing, it may have some value as forage. It is a bushy annual (Fig. 3534), and when broken off in autumn forms one of the tumble-weeds, and is carried long distances before the wind.



3533. Sprig of Russian thistle. (Natural size)

SÁLVIA (Latin name used as far back as Pliny, meaning to be well or healthy, referring to the medicinal properties of some species). *Labiàtæ*. SAGE. Herbs, subshrubs, and shrubs, certain of which are of economic use, such as sage and clary, while others are grown for ornament both indoors and out.

Leaves entire, dentate-incised or pinnatisect; the floral lvs. are frequently changed to bracts, rarely similar to the cauline lvs.: floral whorls 2- to many-fld., variously arranged, spicate, racemose, paniculate or rarely all axillary: fls. variously colored, rarely yellow, and various-sized from large and showy to minute; calyx ovoid, tubular or campanulate, 2-lipped; corolla-tube included or exserted, limb 2-lipped; perfect stamens 2, the connective linear, transversely articulate with the filament: nutlets ovoid-3-edged or rather compressed, smooth.—Upward of 500 species widely distributed in the temperate and warmer regions of both hemispheres. Salvia was monographed in 1848 by Bentham in DC. Prod., vol. 12, and an index to the 407 species therein described is found in Buek's Genera, Species et Synonyma, etc., pars iii. In 1876, Hemsley gave an account in The Garden (9:430–4) of 65 species which had been in cult. up to that time. See also A Synopsis of the Mexican and Central American Species of Salvia, by M. L. Fernald (Proc. Am. Acad. Arts Sci., vol. 35, 1900, and Contrib. Gray Herb. Harvard Univ. N. S. No. 19). In the work just cited 209 species are described and there is an elaborate key. Within the generic limits of Salvia the variation is astonishing. The color of the fls. ranges from scarlet through purple and violet to azure-blue, white and even pale yellow, but there seems to be no good pure yellow. Fig. 3535 indicates something of the range in form of corolla and calyx. Some fls. gape wide open, others are nearly tubular. In some the upper lip is longer than the lower, in other cases the lower lip is longer than the upper. The lower lip is always 3-lobed, but frequently it does not appear to be so, for the lateral lobes are much reduced while the midlobe is greatly enlarged, often deeply lobed, and becomes the showy part of the fl. The calyx is small and green in some, large, colored, and showy in others. In many cases, as *S. leucantha*, the corolla and calyx are of different colors. The bracts range from minute and deciduous to a larger size and more attractive color than the fls. There are usually about 6 fls. in a whorl, sometimes 2, sometimes many. In spite of these and many other wide variations, few attempts have been made to split up Salvia into many genera, presumably from the feeling that the structure of the stamens makes the Salvias a natural, not an artificial group.

Cultivation of salvias. (Wilhelm Miller.)

Three salvias are cultivated for their leaves, which are used in seasoning and also in medicine. These are the common sage, *S. officinalis;* clary, *S. Sclàrea;* and *S. Horminum*. For commercial cultivation of *S. officinalis*, see *Sage*.

Clary is a perennial plant, but is cultivated as an annual or biennial. The plants run to seed the second year, after which it is better to pull up the old plants. The seed may be sown in spring, in drills 12 to 20 inches apart or in a seed-bed, from which the seedlings are pricked out in May. In August the first leaves may be gathered and the plants will continue to yield until June or July of the following year.

Clary (*S. Sclarea*) and its near relative, *S. Horminum*, are plants of exceptional interest. They are cultivated for their culinary and medicinal value and also for ornament, but their ornamental value lies not in the flowers (which are usually insignificant) but in the colored bracts or floral leaves at the tops of the branches. The various varieties are known as the Purple-top clary, Red-top clary or White-top clary; also Red sage and Purple sage. The two species (*S. Sclarea* and *S. Horminum*) seem to be much confused in the catalogues.

Among the salvias grown for ornament there are two large cultural groups, the hardy and the tender. The hardy species are mostly border plants, blooming in spring and early summer. The tender species are

3534. Plant of Russian thistle.

generally used for summer bedding, sometimes for conservatory decoration in winter. Many of them bloom in summer and late fall, especially when they are treated as half-hardy annuals.

As regards color of flowers, there are also two important groups, the scarlet-flowered, and the kinds with blue, purple, violet, white, or variegated flowers. Of the scarlet kinds, *S. splendens* is the most called for; of the blue-flowered kinds, *S. patens* is the most popular of the bedding class, and *S. pratensis* the most sought of the hardy class. *S. patens* probably has the largest flowers of any of the blue-flowered kinds in cultivation.

The most widely used of all salvias cultivated for ornament is *Salvia splendens*, or scarlet sage. This is

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one of the most brilliant red-flowered bedding plants in cultivation. It is generally grown in large masses. It does best in full sunshine, but may be used in shady places to light up dark woody recesses. It should have a dark background of some kind by way of contrast. A well-managed mass of scarlet sage may be maintained in full splendor from the middle of July to frost. It is propagated by either cuttings or seed. It is rather troublesome to keep cuttings or plants over winter, as they are particularly liable to attacks of aphis and red-spider. It is, therefore, important to get seed of an early-blooming variety of compact habit, and to sow the seed early indoors or in a frame in time to get good plants to set outdoors in May. A good raceme is over a foot long, with 30 or more flowers in a raceme, and 2 to 6 flowers in a whorl, each flower being 2 inches or more long. Some varietes have erect racemes, others pendulous, and there are white varieties, together with some intermediate colors. A poorly managed bed of scarlet sage gives a few flowers in September and is cut off in a short time by frost. Wet seasons delay the bloom, and, if the soil is too rich in nitrogen, the plants will make too much growth and the flowers will be late and relatively few. The same principles of cultivation apply to other tender salvias used for bedding. Florists sometimes lift a few plants of scarlet sage before frost, pot them and find that they make attractive plants under glass for a month or two. One advantage that *S. splendens* has over many other red-flowered salvias is that its calyx is as brilliant scarlet as the corolla.

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KEY TO SUBGENERA AND SECTIONS.

A. *Corolla without a hairy ring inside.*
  B. *Anterior portion of connectives deflexed, linear, longitudinally connate or closely approximate.* Subgenus III. JUNGIA.
    Section 7. CALOSPHACE. Species 27–46.
  BB. *Anterior portion of connectives deflexed, abruptly dilated, connected at the callous extremity.* Subgenus II. SCLAREA.
    C. *Calyx ovoid, the upper lip concave, 2-grooved, teeth 3, very short and connivent.*
      Section 6. PLETHIOSPHACE. Species 18–26.
    CC. *Calyx tubular or campanulate.*
      D. *Upper lip of calyx truncate, the teeth small and remote; upper lip of corolla erect and concave.* Section 4. HORMINUM. Species 12.
      DD. *Upper lip of calyx 3-toothed, the teeth straight, scarcely connivent, the middle one often very small.*
        Section 5. ÆTHIOPIS. Species 13–17.
AA. *Corolla with a hairy ring inside.*
  B. *Anterior portion of connectives connected, connate or approximate.* Subgenus I. SALVIA.
    C. *Calyx-teeth scarcely altered in fr., the upper lip of calyx subentire, somewhat 3-toothed.*
      D. *Upper lip of corolla erect, almost straight, concave.* Section 1. EUSPHACE. Species 1–4.
      DD. *Upper lip of corolla bent or falcate, compressed.*
        Section 3. DRYMOSPHACE. Species 7–11.
    CC. *Calyx-teeth membranaceous-dilated in fr., the upper lip of calyx 3-cleft or 3-toothed; upper lip of corolla erect or weakly bent, not or scarcely compressed.*
      Section 2. HYMENOSPHACE. Species 5, 6.
  BB. *Anterior portion of connectives remote.* Subgenus IV. LEONIA.
    C. *Connectives very short, deflexed and subulate anteriorly.* Section 12. HEMISPHACE. Species 52.
    CC. *Connectives directed forward, bearing fertile anther-cells anteriorly.*
      D. *Floral lvs. deciduous; bracts minute.*
        E. *Upper lip of calyx entire or minutely 3-toothed.*
          Section 11. NOTIOSPHACE. Species 51.
        EE. *Upper lip of calyx truncate, 3-toothed.*
          Section 10. HETEROSPHACE. Species 49, 50.
      DD. *Floral lvs. persistent and imbricated.*
        E. *Lvs. and bracts spiny.*
          Section 8. ECHINOSPHACE. Species 47.
        EE. *Lvs. and bracts not spiny.*
          Section 9. PYCNOSPHACE. Species 48.

Subgenus I. SALVIA.

All Old-World species.

Section 1. EUSPHACE.

Shrubs or subshrubs, rarely herbs.

A. *Lvs. all entire.*
  B. *Calyx viscous-pubescent*.....1. **Candelabrum**
  BB. *Calyx villous or pubescent but not viscous.*
    C. *Base of the oblong lvs. narrow-rotundate*.....2. **officinalis**
    CC. *Base of the ovate lvs. broad-rotundate or cordate*.....3. **grandiflora**
AA. *Lvs., at least the lower, pinnatisect*.....4. **ringens**

1. **Candelàbrum,** Boiss. Subshrub, half-hardy: st. shrubby at base, villous: lvs. entire, petiolate, oblong, both surfaces villous, canescent-tomentose beneath: panicle elongated, lax; the floral whorls remote, 3–5-fld.; calyx pedicellate, campanulate, somewhat 2-lipped, 5-toothed, viscous-pubescent; corolla with the upper lip yellowish, whitish streaked, the lower violet. July. S. Spain. B.M. 5017. F.S. 13:1344.

2. **officinàlis,** Linn. SAGE. Hardy, white-woolly subshrub, 6–12 in. high: sts. shrubby, the flowering branches tomentose-pubescent: lvs. entire, 1–1½ in. long, petiolate, oblong, base narrowed or rotund, the lower white-tomentose or lanate beneath or on both surfaces; the floral lvs. sessile, ovate, acuminate at the base, membranaceous, striate: racemes subsimple; floral whorls few, many-fld., distinct; calyx campanulate, membranaceous-colored, striate, pubescent or villous, the teeth subulate-acuminate; corolla purple, blue or white. Medit. region. June.—A common and variable species. Var. **albiflòra,** Alef., has lvs. 3–4 times as long as broad: fls. white. Var. **aùrea,** Hort., is a compact rather dwarf form about 1 ft. high, with golden yellow foliage. Var. **aùrea variegàta,** Hort., is offered in the trade. Var. **crìspa,** Alef., has broad, crisped and variegated lvs. Var. **icterìna,**

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Alef., has green-and-gold lvs. Var. **latifòlia,** Alef., has lvs. twice as long as broad; one of the common cult. forms. Var. **Milleri,** Alef., has rather red and spotted lvs. Var. **purpuráscens,** Alef., has somewhat reddish foliage and is said to be preferred in England for kitchen use on account of its strong and pleasant taste. Var. **rubrifiòra,** Alef., has lvs. 3–4 times as long as broad, and red fls. Var. **salicifòlia,** Alef., has lvs. 4–7 times as long as broad. Var. **sturnina,** Alef., has green-and-white lvs. Var. **tricolor,** Vilm. (*S. tricolor*, Hort., not Lem.), has lvs. of three colors, gray-green, veined with yellowish white and flesh-pink, later becoming velvety rose-red or deep red.

Var. **ténuior,** Alef., has lvs. about 3–4 times as long as broad and blue fls. This is the form commonly cult. as a kitchen herb.

3. **grandifiòra,** Etling. Shrub, 2 ft. or more high: st. woody, white-lanate; the flowering branches tomentose: lvs. entire, petiolate, ovate, acute, the base broad-rotund or cordate, pubescent, the lower ones lanate beneath; floral lvs. herbaceous or the uppermost membranaceous, ovate, acute: racemes subsimple; floral whorls 6–10-fld., distinct; calyx campanulate, colored, striate hispid; corolla blue. June, July. Asia Minor.—Rare in cult. The name is sometimes used in horticulture for plants which belong under *S. azurea* var. *grandiflora* or *S. splendens* var. *grandiflora*.

4. **ringens,** Sibth. & Smith. Hardy shrub, 1–2 ft. high: sts. glabrous or spreading, pilose at base, viscous-pubescent above: lvs. petiolate, irregularly pinnatisect, the segms. unequal, ovate-oblong, base rotundate, both surfaces villous, scarcely canescent beneath, the petioles long-ciliate; floral lvs. membranaceous, deciduous: raceme simple; floral whorls about 6-fld., lax, remote; calyx nodding, tubular-campanulate, striate, villous-viscous, the teeth rather acute; corolla reddish purple or light blue, the tube recurved-ascending, the throat very broad. Summer. Greece. Gt. 2:226.

Section 2. HYMENOSPHACE.

Shrubs or subshrubs, rarely herbs. Oriental and S. African species.

A. *Lvs. ovate-subrotund*..... 5. **aurea**
AA. *Lvs. hastate-triangular*..... 6. **canariensis**

5. **aùrea,** Linn. Shrub, 3 ft. or more high, white-tomentose: lvs. ½–1 in. long, petiolate, ovate-subrotund, obtuse, entire or sinuate, leathery, hoary; floral lvs. sessile, villous, persistent: racemes dense, 2–4 in. long, somewhat branched; floral whorls 2-fld., approximate; calyx broad-campanulate, villous, the lips membranous dilated, veined, and colored, the lobes ovate-rotundate; corolla very beautiful, golden yellow, the galea somewhat falcate. July. S. Afr. B.M. 182. G.C. II. 26:745.—Intro. into Calif. According to one grower the fls. are at first sulfur-yellow turning very quickly to a rusty color.

6. **canariénsis,** Linn. Shrub, about 6 ft. high: st. shrubby, white-lanate: lvs. petiolate, lanceolate, hastate-triangular, subglabrous; floral lvs. ovate-lanceolate, membranaceous and colored: racemes branched; floral whorls approximate, distinct, about 6-fld.; calyx incurved-campanulate, the lips dilated membranaceous, colored; corolla purplish, the galea somewhat falcate. Canary Isls.—Probably not in common cult.

Section 3. DRYMOSPHACE.

Herbs, usually tall and glutinous.

A. *Corolla yellow.*
B. *Plant about 3 ft. high: lvs. ovate-oblong*..... 7. **glutinosa**
BB. *Plant 6–12 in. high: lvs. ovate-trilobed or triangular*..... 8. **nipponica**
AA. *Corolla blue or purplish.*
B. *Raceme simple, spike-like: lvs. purple beneath*..... 9. **yunnanensis**
BB. *Raceme more or less branched.*
C. *Floral whorls 6-fld.*.....10. **hians**
CC. *Floral whorls about 2-fld.*.....11. **Przewalskii**

See *S. flava*, G. Forest, in supplementary list, which probably belongs to this section.

7. **glutinòsa,** Linn. (*S. nubícola*, Wall.). Perennial, about 3 ft. high: st. herbaceous, erect, glutinous-pilose, divaricately branched: lvs. petiolate, the lowest 7–8 in. long, the upper smaller, ovate-oblong, acuminate, dentate, the base cordate-sagittate; floral lvs. ovate, acuminate: racemes simple; floral whorls distant, laxly few-fld.; calyx tubular; corolla pale yellow, often 1½ in. long, the tube exserted with its throat broadened. July. Eu. and Asia.

3535. Types of Salvia. At the left S. carduacea; unique for its fringed flowers. Next is S. leucantha, example of kinds in which the flower does not gape widely. The two at the right, S. hians and S. Sessei, are interesting for the size and lobing of the middle lobe of the lower lip. (All × ⅓)

8. **nippónica,** Miq. Herb, 6–12 in. high, slightly branched: sts. ascending-erect: lvs. petiolate, opposite, ovate-trilobed or triangular from a truncate cordate-hastate base, the basal lobes horizontal-spreading, the midlobe ovate, larger or equal, all short-acuminate, dentate-crenate, sparsely hirtellus-pubescent above and especially so on the nerves beneath; cauline lvs. 1–3½ in. long; floral lvs. ovate, entire: racemes rather lax, 2–4 in. long; floral whorls frequently 4-fld.; calyx obconic- or subcampanulate-tubular, pilose, glandular-punctate; corolla whitish glandular, puncticulate when dry, tube half exserted. Japan.

9. **yunnanénsis,** C. H. Wright. Perennial herb, about 1 ft. high: rhizomes creeping, bearing fusiform tubers: lvs. 1½–3 x ¾–1 in., the radical frequently very long and slender-petioled, oblong, crenate, green above, purple beneath: spikes simple; floral whorls 4–6-fld.; calyx glandular; corolla cobalt-blue, 1 in. long, pubescent outside. China.

10. **hians,** Royle (*S. himalàyaca*, Hort.). Fig. 3535. Hardy perennial, about 2 ft. high: st. herbaceous, erect, villous: lvs. long-petiolate, ovate, base broadly cordate-sagittate or truncate; floral lvs. ovate, acuminate: racemes somewhat branched; floral whorls 6–fld.; calyx campanulate, striate, bluish, glutinous; corolla

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showy, blue, tube exserted, broad, the limb short, gaping, the upper lip falcate. June. Cashmere. B.M. 6517. B.R. 27:39. R.H. 1845:145. Gt. 35:1221. Var. **plectranthifòlia,** Paxt., has fls. which are rather smaller, less hairy and deeper violet than the type.

11. **Przewálskii,** Maxim. Sts. ascending, 3–5 ft. high, herbaceous, pubescent, glandular above: radical lvs. long-petioled, crenate-dentate, hoary-tomentose beneath, acute, cordate-oblong; cauline lvs. acute, hastate-cordate; floral lvs. ovate, acute: racemes composite, spike-like; floral whorls distant, about 2-fld.; calyx campanulate, striate, glandular, the teeth acute, short-triangular; corolla violet, the tube long-exserted. June. China.

Subgenus II. SCLAREA.

All Old-World, herbaceous species.

Section 4. HORMINUM.

Annual herbs.

12. **Horminum**

12. **Hormìnum,** Linn. Annual, about 1½ ft. high: st. herbaceous, erect, villous: lvs. petiolate, oval-oblong, base rotund or cuneate, obtuse, crenate, villous; floral lvs. very broad, acute, persistent, the upper ones variously colored: racemes simple; floral whorls distant, about 6-fld.; calyx tubular, pubescent; corolla light lilac or pale violet to reddish violet or purple. June–Aug. S. Eu. Var. **álba,** Hort., has white floral lvs. Var. **purpùrea,** Hort., misspelled *purpureum* (*S. Hormìnum* var. *rùbra,* Hort.), has bright carmine-red to brilliant purple-red floral lvs. darker veined. Var. **violàcea,** Hort. (*S. Bluebeard,* Hort.), has light violet-blue floral lvs. somewhat larger and darker veined. Var. **vulgàris,** Hort., has violet-blue floral lvs., with darker veins.

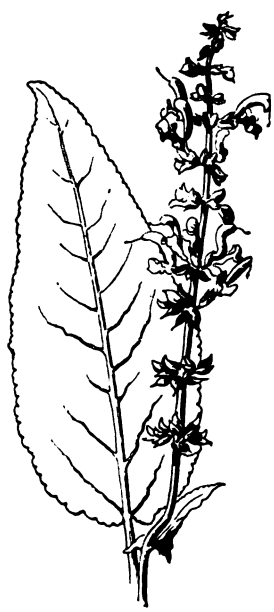
Section 5. ÆTHIOPIS.

A. *Lvs. or lobes of the lvs. oblong-lanceolate or linear*.....17. **Montbretii**
AA. *Lvs. or lobes of the lvs. broad-ovate.*
B. *The lvs. hoary-tomentose*.....13. **Sclarea**
BB. *The lvs. green, the white wool lax.*
C. *Floral lvs. all floriferous*.....14. **æthiopis**
CC. *Floral lvs., the uppermost, sterile.*
D. *Plant about 2 ft. high: panicle strongly branched*.....15. **argentea**
DD. *Plant scarcely 1 ft. high: panicle slightly branched*.....16. **verbascifolia**

13. **Sclàrea,** Linn. (*S. bracteàta,* Sims, not Soland., in Russ. *S. Simsiàna,* R. & S.). CLARY. Biennial, 2–3 ft. high: st. herbaceous, stout, erect, villous: lvs. often 8–9 x 4–5 in., petiolate, broad-ovate, erose-crenate, base cordate, hoary, the uppermost clasping; floral lvs. very broad, acuminate, concave, membranaceous, colored, their base white, their tips rose: racemes paniculate; floral whorls distant, about 6-fld.; calyx campanulate, striate, pubescent-hispid, the teeth rather spiny-acuminate; corolla whitish blue, the tube included. Aug. S. Eu. B.M. 2320. B.R. 1003. G.C. III. 44:268. Gn. 64, p. 249. G.M. 57:173. Var. **turkestánica,** Hort. (*S. turkestánica,* Hort. *S. turkestaniàna,* Hort.), grows 3 ft. high, has quadrangular sts. tinged with pink, basal lvs. on long petioles and long spikes, 2½ ft. high, of large white fls., tinged with pink. There is a form offered in the trade under the name of *S. turkestánica supérba,* Hort., which has "dense branched pyramids of silky foliage and conspicuous rosy bracts, and white fls." **S. bracteàta,** Soland., in Russ., is a valid species belonging to Section 1. It is a subshrub about 1–1½ ft. high, with purplish fls. and a native of Asia Minor and Syria. Probably not in cult.

14. **æthiòpis,** Linn. Perennial, 6–12 in. or more high: st. herbaceous, erect, white-lanate: lower lvs. petiolate, narrow at base; cauline lvs. cordate-clasping; all incise-dentate, densely white-lanate on both surfaces; floral lvs. very broad, acuminate, persistent, concave, lanate: racemes paniculate; floral whorls distinct, 6–10-fld.; calyx campanulate, leathery, lanate, plicate-striate, the teeth all subulate-spinose; corolla white, the upper lip often reddish, tube contracted at the middle; connectives not toothed. S. Eu., N. Afr., and the Orient.—Probably not common in cult. *S. æthiopis,* Brot., not Linn., equals *S. argentea,* which see.

15. **argéntea,** Linn. (*S. pùtula,* Desf.). Biennial, 2–4 ft. high: sts. herbaceous, erect, villous: lvs. radical and lower cauline, 6–8 x 4–6 in., broad-ovate, sinuate-lobate, the lobes erose-crenate, lanate; floral lvs. very broad, acuminate, concave, persistent: panicles divaricate-branched; floral whorls remote, 6–10-fld., the uppermost abortive; calyx campanulate, striate, the teeth all subspinose; corolla showy, rose-white, whitish, purplish or yellowish, the galea or upper lip much longer than the lower. June. Medit. region of Eu. and Afr. F.C. 3:112. Gn. 73, p. 517.—For some reason this species is considered a hardy perennial by American seedsmen. The foliage is white-woolly, making it a very decorative plant.



3536. Salvia pratensis. (×⅓)

16. **verbascifòlia,** Bieb. (*S. microstègia,* Boiss. & Bal.). Perennial: st. herbaceous, erect, viscous-villous: lower lvs. petiolate, broadly ovate, base cordate, sinuate-lobate, erose, thick, very wrinkled, scarcely lanate above, white tomentose-lanate beneath; floral lvs. very broad, acuminate, concave, persistent, villous: panicles twiggy branched; floral whorls 2–6-fld., approximate, distinct, the uppermost abortive; calyx campanulate, striate, viscous-villous; corolla white, beset with blue hairs, galea very large and falcate. Caucasus region. Var. **kúrdica,** Hort., is offered in the trade.

17. **Montbrètii,** Benth. Perennial subshrub, low: sts. erect, the base white-lanate, the top viscous-villous: lvs. lanceolate; the lower petiolate, the upper clasping, crenulate or obscurely pinnatifid-dentate, laxly white-lanate above, densely so beneath; floral lvs. very broad, lanate beneath: racemes simple; floral whorls 6–10-fld.; calyx oblong-tubular, viscous-pubescent; corolla blue. Asia Minor and Syria.

Section 6. PLETHIOSPHACE.

A. *Corolla 1 in. or more long.*
B. *Pedicels longer than the calyx.*
C. *Lower lvs. incise-palmatifid*.....18. **bicolor**
CC. *Lower lvs. oblong-ovate or ovate-lanceolate, sinuate-serrate*.....19. **dichroa**
BB. *Pedicels shorter than the calyx.*
C. *Sts. subsimple, 1–3 ft. high*.....20. **pratensis**
CC. *Sts. 4–6 ft. high: panicles branched, very large*.....21. **virgata**
AA. *Corolla ½in. or less long, rarely as much as ¾in.*
B. *Lvs. incise-pinnatifid*.....26. **controversa**
BB. *Lvs. entire, crenate or erose-dentate.*
C. *Racemes erect and strict.*
D. *The lvs. all oblong-lanceolate or narrowly oblong.*
E. *Under surface of lvs. canescent*.....22. **sylvestris**

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EE. *Under surface of lvs. pubescent but not canescent*.....23. **nemorosa**
DD. *The lvs., at least the lower ones, broad-ovate or ovate-oblong.*
E. *Plant scarcely 2 ft. high: corolla scarcely ½in. long*....25. **Verbenaca**
EE. *Plant 4–6 ft. high: corolla usually about ¾in. long*...21. **virgata**
CC. *Racemes nodding at the top*.....24. **nutans**

18. **bícolor,** Lam. Biennial, sometimes perennial (?), hardy: sts. herbaceous, erect, 2–3 ft. high, scarcely branched: lvs., the lowest petiolate, broad-ovate, incise-dentate, pinnatifid or palmate-lobate; the upper sessile, lanceolate, all cordate at base and glutinose-pubescent; floral lvs. ovate-lanceolate, acuminate, reflexed: racemes 1½–2 ft. long, many-fld.; floral whorls distinct, about 6-fld.; calyx campanulate, striate, glutinose-hispid, the teeth subulate-acuminate; upper lip of corolla hooded, bluish violet dotted with yellow, the lower one white, but said to fade quickly to a rusty brown. May–July. Spain and N. Afr. B.M. 1774. G.M. 40:487. P.M. 9:271.

19. **díchroa,** Hook. f. Half-hardy perennial: sts. 2–3 ft. or more high, quadrangular with obtuse thickened yellowish angles, which are retrorsely ciliate: radical lvs. petioled, 6–8 in. long, oblong-ovate or ovate-lanceolate, obtusely and very irregularly sinuate-serrate, pubescent; upper cauline lvs. sessile-oblong or elliptic-oblong; floral lvs. ovate, long-acuminate, reflexed: raceme 1 ft. or more long, many-fld.; floral whorls 2–3-fld.; calyx subcampanulate, glandular-pubescent, strongly ribbed, green; corolla 1–1½ in. long, upper lip bright blue, arcuate, pubescent, lower lip 3-lobed, the lateral lobes pale blue, the midlobe orbicular, pendulous, white. Aug. Atlas Mts. of N. Afr. B.M. 6004. G.C. III. 40:177. Gn. 72, p. 78.—By some authorities this is considered the same as *S. bicolor*.

20. **praténsis,** Linn. Fig. 3536. Hardy perennial, 2 ft. or more high: root sometimes tuberous: sts. herbaceous, erect, subsimple, pubescent: lvs., especially in the southern varieties, more or less blood-red maculate; radical lvs. petiolate, oblong-ovate, obtuse, crenate or incised, base cordate, bullate-rugose, glabrous above, pubescent beneath along the petiole and nerves; cauline lvs. few, sessile; floral lvs. cordate-ovate: racemes viscous, subsimple; floral whorls 6-fld., distant; calyx subsessile, campanulate, viscous-villous; corolla bright blue, rarely reddish or white, large, 1 in. long. June–Aug. Eu. Var. **álba,** Hort., has pure white fls. Var. **albiflòra,** Hort., is a white-fld. form; perhaps this and the preceding are the same. Var. **atrovioláceа,** Hort., has dark violet fls. Var. **Baumgártenii,** Hort. (*S. Baumgártenii*, Heuff.), has violet fls. Var. **lupinoìdes,** Hort. (*S. lupinoìdes*, Hort.), is said to grow 2 ft. high and to have bluish purple and white fls. Var. **ròsea,** Hort. (*S. salvatòri*, Hort.), has rosy purple fls. Var. **rubicúnda,** Hort. (*S. rubicúnda*, Wender.), has rose-red fls. Var. **supérba,** Hort., is offered in the trade. Var. **Tenòrii,** Hort. (*S. Tenòrii*, Spreng.), is said to grow 2 ft. high and to have deep blue fls. Var. **variegàta,** Hort. (*S. variegàta*, Waldst. & Kit.), has light blue fls. with the midlobe of the lower lip white.

21. **virgàta,** Ait. (*S. gigantèa*, Desf.). Hardy perennial, 2 ft. or more high: sts. herbaceous, erect, branched, pubescent-villous: radical lvs. petiolate, broad-ovate, base cordate; lower cauline lvs. short-petioled, broad ovate-oblong, base rotund or cordate, upper ones sessile and smaller, the uppermost cordate, clasping; all the lvs. erose-crenate, rather glabrous above, pubescent or hispid on the nerves beneath; floral lvs. ovate-acuminate somewhat reflexed: racemes branched, elongated, few-fld.; floral whorls 6-fld., distant; calyx short-pedicelled, campanulate, striate, villous-viscous; corolla light blue, the tube included. S. E. Eu. and the Orient. **Var. álba,** Hort., a white form, is offered in the trade.

22. **sylvéstris,** Linn. Hardy perennial, 6 in. to 3 ft. high: sts. herbaceous, paniculate above: lvs. often small, scarcely 2 in., sometimes 3–4 in. or more long, the lower petiolate, the upper sessile, all oblong-lanceolate, crenate, base rounded or frequently cordate, glabrous above, paler, pubescent or canescent beneath; floral lvs. orbiculate, acuminate, colored: racemes elongated, somewhat branched; floral whorls 6–10-fld., distinct; calyx ovate-tubular; corolla purple-violet. Aug. Eu. and Asia. Var. **álba,** Hort. (*S. sylvéstris* var. *flòre-álbo*, Hort.), is a white-fld. form.

23. **nemoròsa,** Crantz (*S. virgàta*, Hort., not Ait. *S. virgàta nemoròsa*, Hort.). Fig. 3537. Perennial, 2–3 ft. high, much branched: radical lvs. short-petioled, cauline sessile, lanceolate, 2½–3 in. long, the upper lvs. gradually reduced in size, glabrous and dull green above, pale and finely pubescent beneath: fls. small, in very long slender spikes terminating all the branches, up to 16 in. long; floral whorls approximate, 6-fld.; corolla bright violet or purple. June–Oct. Eu. and W. Asia. G.M. 56:714. R.H. 1913, p. 471.—The fls. are sometimes described as being bronzy purple. Var. **álba,** Hort., is said to grow 18 in. high and to have short spikes of white fls. This may be the same as *S. sylvestris* var. *alba*, as *S. nemorosa*, Linn., is a synonym of *S. sylvestris*.

24. **nùtans,** Linn. Hardy perennial, 2–3 ft. high: sts. herbaceous, subsimple, pubescent to nearly naked: lvs. few, the lower long-petioled, ovate-oblong, 4–5 in. long, double-crenate, the base subcordate; floral lvs. minute, orbicular: racemes short, 1–1½ in. long, paniculate, long-peduncled, nodding after anthesis; floral whorls about 6-fld., approximate; calyx reflexed, pubescent; corolla violet, the galea straight and spreading. July. S. E. Eu. B.M. 2436.

25. **Verbenàca,** Linn., also spelled *verbenàcea*. (*S. Spièlmanni*, Willd.). Hardy perennial, 1–2 ft. high: sts. herbaceous, erect, pubescent or villous: lvs. often 3–4 in. long, broad-ovate or oblong, crenate, glabrous; the lower long-petioled, base narrowed; the upper broader, sessile, base cordate, floral lvs. ovate-rotund, acuminate, villous, persistent: racemes elongated, simple or somewhat branched; floral whorls remote, about 6-fld.; calyx ovate, hirsute; corolla blue, rarely white, galea straight or somewhat falcate. June–Sept. Eu. and Orient. Var. **clandestìna,** Briquet (*S. clandestìna*, Linn.), is a smaller and more slender form than the type, with narrower lvs. and more purple fls. and the upper lip of the corolla is longer arched. Eu.—*S. spelmìna*, Hort., is a name appearing in American trade-lists for a plant which grows 2 ft. high and with deep blue fls. in July. Presumably an error for *Spielmanni*.

3537. Salvia nemorosa. (×⅙)

26. **controvérsa,** Ten. St. herbaceous, pubescent or villous: lvs. oblong, incisely pinnatifid, the lobes oblong-linear, very obtuse, incise-crenate, bullate-rugose, the margin revolute, both surfaces somewhat pilose; floral lvs. ovate-rotundate acuminate: racemes branched, long, white-villous; floral whorls 6–10-fld., the lower remote, the upper approximate; calyx ovate, very long

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hirsute-lanate, the teeth minute; corolla small, sometimes minute. Medit. region.—Not common in cult.

Subgenus III. JUNGIA.

All American species.

Section 7. CALOSPHACE.

Herbs, subshrubs or shrubs.

A. *Lvs. rugose: corolla-tube slightly exserted, straight, ventricose or broadened above, the lips subequal or the upper longer.*

Subsection ERIANTHÆ.

(See also Nos. 36, 39, 43 and 44.)

31. **leucantha**

AA. *Lvs. seldom rugose (rugose in Nos. 36, 39, 43, and 44).*

B. *Corolla about ½in., occasionally a little longer.*

Subsection BRACHYANTHÆ.

C. *The lvs. cordiform*.....30. **amarissima**

CC. *The lvs. linear, lanceolate, or ovate-lanceolate.*

D. *Calyx densely white or violet-lanate*.....28. **farinacea**

DD. *Calyx pubescent or slightly tomentose but not densely lanate.*

E. *Floral lvs. lanceolate-linear: floral whorls about 6-fld.*....27. **azurea**

EE. *Floral lvs. broad-ovate: floral whorls 10–20-fld.*.....29. **uliginosa**

BB. *Corolla ¾–5 in. long.*

Subsection LONGIFLORÆ.

C. *Base of some or all the lvs. hastate or angulate-cordate.*

D. *Under surface of lf. hispid or pubescent*.....45. **patens**

DD. *Under surface of lf. soft-villous and reddish or whitish*.....46. **cacaliæfolia**

CC. *Base of lvs. sometimes cordate, but not angulately so.*

D. *Calyx inflated-campanulate*....33. **Sessei**

DD. *Calyx not inflated, usually tubular-campanulate.*

E. *Lvs. membranaceous*.....32. **splendens**

EE. *Lvs. more or less coriaceous.*

F. *Tube of corolla not ventricose.*

G. *Base of lvs. narrowed*...42. **Goudotii**

GG. *Base of lvs. rounded or cordate.*

H. *Calyx glabrous, the teeth acute*.....43. **coccinea**

HH. *Calyx soft-pubescent, the teeth long setaceous-acuminate*...44. **longistyla**

FF. *Tube of corolla ventricose.*

G. *Corolla usually bluish, purplish, or violet.*

H. *The lvs. cuneate or narrowed at base*...39. **albo-cærulea**

HH. *The lvs. round, round-truncate, or cordate at base.*

I. *Under surface of lf. glabrous*.....40. **ianthina**

II. *Under surface of lf. pubescent*.....41. **cyanea**

GG. *Corolla usually scarlet or crimson, sometimes turning purple with age (cf. No. 33).*

H. *Lvs. ⅜–1 in. long,*

I. *Blade of lf. ovate or broad-oblong*.....34. **Grahamii**

II. *Blade of lf. narrow-oblong to linear-lanceolate*.....35. **Greggii**

HH. *Lvs. more than 1 in. long.*

I. *Lower surface of lf. pubescent*.....36. **fulgens**
37. **gesneræflora**

II. *Lower surface of lf. glabrous*.....38. **involucrata**

Subsection BRACHYANTHÆ.

27. **azùrea,** Lam. (*S. acuminàta*, Michx., not Cav.). Perennial, 1–6 ft. high: sts. herbaceous, erect, glabrous: lvs. petiolate, oblong-lanceolate or linear, rather obtuse or acute, base long-narrowed, somewhat serrate, both surfaces green and glabrous; floral lvs. lanceolate-linear, deciduous: racemes simple, elongated; floral whorls distant, about 6-fld.; calyx green or bluish, subsessile, tubular, striate, the 3 teeth broad, rather acute; corolla blue. Aug. S. C. to Fla. and Texas. B.M. 1728. Var. **grandiflòra,** Benth. (*S. Pitcheri*, Torr.), which differs in being cinereous-puberulent, in its denser infl. and tomentulose-sericeous calyx. G.C. II. 14:685. Gn. 19:600; 61, p. 309. G.Z. 26:121.—Probably the plant formerly offered as *S. Pitcheri* var. *angustifòlia*, Hort., belongs here. It is quite probable that some of the material in the trade as *S. azurea* var. *grandiflora* is in reality *S. farinacea*. Var. **grandiflòra álba,** Hort. (*S. azùrea* var. *álba grandiflòra*, Hort.), is a white-fld. form of the variety.

28. **farinàcea,** Benth. Perennial, 2–3 ft. high: st. herbaceous, erect, tomentose: lvs. petiolate, ovate-oblong, or lanceolate, rather obtuse, irregularly serrate-crenate, rather glabrous, both surfaces green or the lower canescent; floral lvs. small, deciduous: racemes elongated, simple; floral whorls many-fld., subsecund, remote or the uppermost approximate; calyx subsessile, tubular, purplish colored, densely white-lanate; corolla purple or violet, the tube scarcely exserted. Summer. Texas, where it is reported as growing in rich soil. Gn. 9:430; 28, p. 59; 78, p. 226. R.H. 1873:90.—A showy frequently cultivated species, the fls. quite attractive, the darker corollas being set off by the mealy lighter violet-white calices. Var. **álba,** Hort., is a white-fld. form with the midlobe of the lower corolla-lip obcordate, 2-lobed.

29. **uliginòsa,** Benth. Sts. herbaceous, erect, 2–6 ft. high, virgate, branched, glabrous or villous: lvs. 2–4 in. long, petiolate, oblong-lanceolate, acute, serrate, base narrowed, glabrous or pubescent; floral lvs. membranaceous, broad-ovate, acuminate, deciduous: racemes dense, long-peduncled, somewhat branched; floral whorls many-fld.; calyx campanulate, variable, sometimes colored; corolla blue or white, tube somewhat or nearly included. Brazil, Argentina, and Uruguay. B.M. 8544. Gn. 77, p. 484. G.M. 56:711. R.H. 1912, p. 469.

30. **amarissima,** Ort. Perennial, about 2 ft. high: sts. herbaceous, erect, branched, pilose-hispid: lvs. petiolate, ovate-cordate, crenate, canescent below; floral lvs. ovate, acuminate, deciduous: racemes simple, densely fld.; floral whorls distinct, subremote, about 10-fld.; calyx tubular-campanulate, striate-villous, the 3 teeth rather acute; corolla blue. Aug. Mex. B.R. 347.—Probably rare in cult.

Subsection ERIANTHÆ.

31. **leucántha,** Cav. Fig. 3535. Shrub, about 1½–2 ft. high: st. shrubby, with elongated branches which are subterete, and white-lanate, the wool finally caducous: lvs. short-petioled, lanceolate-linear, acute, crenate, base rotundate, pubescent and rugose above, white-lanate beneath; floral lvs. ovate, acuminate, deciduous: raceme elongated, often purplish, 6–10 in. long; floral whorls many-fld., the lower remote; calyx subsessile, ovate, densely lavender- or violet-lanate; corolla white, white-lanate outside. June. Mex. B.M. 4318. Gn. 21:328.—Probably not very common in cultivation, at least in N. Amer.

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Subsection LONGIFLORÆ.

Nobiles.

32. **spléndens,** Ker-Gawl. (*S. cólorans,* Hort. *S. brasiliénsis,* Spreng.). SCARLET SAGE. Figs. 3538, 3539. Tender shrub or subshrub, treated as an annual, about 3 ft. high: st. shrubby with glabrous branches: lvs. petiolate, ovate, acuminate, crenate-serrate, base cuneate, rotundate or cordate, both surfaces glabrous; floral lvs. ovate, acuminate, colored: racemes terminal, spikelike, 6 in. or more long; floral whorls about 2-fld. (2- rarely 6-fld.), about 30 fls. in a raceme; calyx campanulate, membranaceous, scarlet, glabrous or villous, teeth 3, broad-ovate, acute; corolla scarlet, glabrous. Autumn. Brazil. B. R. 687. L.B.C. 11:1089. Var. **álba,** Hort., has creamy white fls. Var. **atropurpûrea,** Hort., a form with dark violet-purple fls. Var. **atrosanguínea,** Hort., has deep crimson fls. Var. **bícolor,** Hort., with large spikes of scarlet-and-white fls. Var. **Brunânti,** Hort., dwarfer than the type in habit and brighter scarlet fls. G.C. II. 14:781; III. 6:653. Gn. 21:328 (good). A. F. 5:331. Var. **compácta,** Hort., dwarfer habit, racemes thicker and more numerous, fls. brilliant scarlet. Var. **compácta álba,** Hort., a whitish variant of the preceding variety. Var. **compácta erécta,** Hort., a dwarf form with dark scarlet fls. Var. **grandiflòra,** Hort., is a tall-growing large-fld. form. G.M. 43:853. R.B. 27:12. The following variants of this variety are offered: Var. *grandiflòra erécta,* Hort. Var. *grandiflòra nàna,* Hort. Var. *grandiflòra péndula,* Hort. Var. *grandiflòra prostràta,* Hort. Var. **Issánchon,** Hort. (*S. brasiliénsis* var. *Issánchon,* Hort.), has the calyx white, striped red and a rose-white corolla, habit similar to var. *compacta.* Var. **nàna,** Hort., is a dwarf form, rather early flowering, the fls. bright red. Var. **purpûrea,** Hort., is offered in the trade. Var. **pyramidàlis,** Hort., is offered in the trade. F.E. 31:325. Var. **rôseo-carmínea,** Hort., is offered in the trade. Var. **semperflòrens,** Hort., is characterized as an early and continuous-flowering form. Var. **Souchétii,** Planch. (*S. Souchétii,* Hort.), is probably the same as var. *compacta.* There is a white-fld. variant of this variety known in the trade as *S. Souchétii* var. *álba,* Hort. Var. **violàcea,** Hort., is offered in the trade.—**S. nàna,** HBK., is a valid species belonging to Section 7. It is herbaceous, with a perpendicular, thickened tuberous root, almost stemless, with subsessile radical lvs. forming a rosette, and blue fls. Mex. Probably not in cult.

3538. Salvia splendens. (×½)

Inflatæ.

33. **Séssei,** Benth. (*S. Roèzlii,* Scheidw.). Fig. 3535. Subshrub, about 1½ ft. high: sts. shrubby with rather glabrous branches: lvs. 2–3 in. long, somewhat leathery, petiolate, broad-ovate or ovate-oblong, acuminate, base rounded cuneate or narrow, both surfaces glabrous or pubescent; floral lvs. smaller, the uppermost minute, deciduous: panicle short, lax; floral whorls few-fld.; calyx inflated-campanulate, scarlet, glabrous; corolla scarlet, almost 2 in. long, pubescent. Summer. Mex. F.S. 14:1407.

Fulgentes.

34. **Gràhamii,** Benth. Shrub, 2–3 ft. high: st. shrubby with glabrous or very slightly pubescent branches: lvs. petiolate, oval, obtuse, base rounded or cuneate, irregularly crenate in the center, subglabrous; floral lvs. ovate, acuminate, ciliate, deciduous: racemes elongated, more than 1 ft. long; floral whorls 2-fld.; calyx tubular, striate-nerved, pubescent, frequently colored; corolla deep crimson or when older purple, the midlobe of the lower lip, which is large and obcordate, has two small white spots. Summer. Mex. B.R. 1370. L.B.C. 18:1798. G.W. 15, p. 48.

35. **Gréggii,** Gray. Shrub, 1–3 ft. high: sts. glabrous or obscurely farinaceous; the branches slender: lvs. coriaceous, 1-ribbed, almost veinless, oblong, entire, base narrowed to a short petiole: racemes 2–3 in. long, 6–8-fld.; calyx narrowly campanulate, slightly pubescent or glandular; corolla red or purplish red, about 1 in. long, the tube strongly ventricose-gibbous, the throat abruptly contracted, the lower lip large and showy. Autumn. Texas and Mex. B.M. 6812. Var. **álba,** Hort., is a white-fld. form.

36. **fúlgens,** Cav. (*S. cardinàlis,* HBK.). CARDINAL SALVIA. MEXICAN RED SALVIA. Perennial shrub, 2–3 ft. high: the numerous branches almost glabrous or pilose-hirsute: lvs. petiolate, 1–3 in. long, ovate, acute, crenate-serrate, base cordate, pubescent above, white-tomentose or lanate beneath; floral lvs. sessile, ovate, deciduous: racemes 6–12 in. long; floral whorls 6-fld., rather distant; calyx pedicelled, tubular-campanulate, pubescent; corolla showy scarlet, about 2 in. long, villous. July. Mex. B.R. 1356. L.B.C. 20: 1910.—The fls. are darker red than those of *S. splendens* and the calyx is said to be dull colored and conspicuously striate. Apparently not very frequently cult. Var. **Boucheàna,** Benth. (*S. Boucheàna,* Kunth), has the lvs. narrowly deltoid-ovate, truncate or subcordate at the base. Mex.

37. **gesneræflòra,** Lindl. & Paxt. (*S. gesneriæfòlia,* Lem.). Perennial herb about 2 ft. high (possibly sometimes a subshrub): the branches numerous and glandular-pilose: lvs. ovate-cordate, short-acuminate, crenulate-dentate, puberulent-ciliate and rugose-plicate above, densely long-pubescent-canescent beneath: floral whorls 5–6-fld., with very short pedicels; calyx green, tubular-dilated; corolla scarlet, 2 in. or more long, the tube globose-inflated, throat slightly constricted, short-pubescent. Said to flower in April and again in Nov. Colombia. F.S. 20:2131. I.H. 1:32. J.F. 2:179. J.H. III. 48:191.—Considered by many to be only a variety or form of *S. fulgens* which it closely resembles.

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38. **involucràta,** Cav. Half-hardy subshrub, several feet high: sts. shrubby; the branches elongated: lvs. petiolate, 2–3 in. long, ovate, acuminate, crenate-serrate at the middle, the base rotund-cuneate, glabrous; floral lvs. bract-like, sessile, broad-ovate, acuminate, colored, deciduous after anthesis: racemes spicate, in fl. subglobose, at length 4–6 in. long; floral whorls about 6-fld., approximate; calyx tubular-campanulate, striate, viscous, often colored, the teeth setaceous-acuminate; corolla rose, tube ventricose, generally long-exserted, sometimes short, galea villous. Aug. Mex. and Cent. Amer. B.M. 2872. B.R. 1205. R.H. 1858, p. 239. H.F. II. 2:204.—The floral lvs. are large, showy, and rather a rose-purple, the fls. frequently shading toward purple. Var. **Béthellii,** Hort. (*S. Béthellii,* Hort.), is a horticultural form with large, cordate-oval lvs. and bright rosy crimson or puce fls. borne in large terminal whorled spikes. F.M. 1881:464. G.C. II. 15:49. Var. **Deschampsiàna,** Verl., grows 3 ft. or more high: lvs. cordate-acuminate: fls. in ovate spicate terminal clusters: bracts ovate, caducous, they and the calyx bright red; corolla bright rose. French garden origin. R.H. 1869:134, desc.

Cyaneæ.

39. **álbo-cærùlea,** Lind. Subshrub, about 3 ft. high: sts. erect: lvs. petiolate, oblong-lanceolate, long-acuminate, 4–6 in. long, crenate-serrate, decurrent into the petiole, nearly glabrous above, softly pubescent beneath: racemes simple, 6–12 in. long; floral whorls 4– to many-fld.; calyx green, campanulate-tubular, glandular-pubescent; corolla-tube and upper lip cream-colored, lower lip rich indigo-blue sometimes tinged with violet or purple. Summer. Mex. F.S. 13:1340. Gt. 7:96.—Rare in cult.

40. **iánthina,** Otto & Dietr. (*S. Hóveyi,* Hort.). Perennial, about 2 ft. high: sts. herbaceous, erect, puberulous: lvs. ovate-subcordate, acuminate, crenate, rugose, paler beneath; floral lvs. ovate, acuminate, colored: infl. terminal; floral whorls 6-fld., clustered; corolla large, intense purple-violet. June. Habitat uncertain, probably Mex. or Peru. F.S. 9:884. R.H. 1854:61. G.C. II. 15:145.

41. **cyànea,** Benth. St. shrubby: branches 4-angled, hoary-pubescent or glabrous: lvs. petiolate, ovate, acuminate, serrate-crenate, pubescent, or frequently canescent beneath; floral lvs. ovate, acuminate, membranaceous, deciduous: racemes simple; floral whorls laxly 6–10-fld., subsecund; calyx tubular, bluish, glandular-villous; corolla blue, the tube exserted and ventricose. Mex. and Cent. Amer.

Tubulifloræ.

42. **Goudòtii,** Benth. (*S. lantanæfòlia,* Hort., not Mart. & Gal.). Shrub, about 2 ft. high, with the branches red-puberulent or glabrous: lvs. about 3 in. long, ovate or ovate-lanceolate, acuminate, serrate-crenate, base narrowed, both surfaces pubescent; floral lvs. lanceolate-subulate, deciduous: racemes simple; floral whorls 6–10-fld., subsecund; calyx tubular-campanulate, the teeth ovate, ciliate-margined; corolla red, more than 1 in. long. Colombia. R.B. 25:121.

43. **coccínea,** Linn. (*S. ròsea,* Vahl). Annual or sometimes perennial and subshrubby: st. herbaceous, erect, 1–2 ft. high, canescent-pubescent: lvs. petiolate, 1–2 in. long, ovate, acute, crenate, base cordate, pubescent above, hoary-tomentose beneath; floral lvs. ovate, acuminate, deciduous: racemes simple; floral whorls remote, 6–10-fld.; calyx tubular-campanulate, striate, often purplish, the teeth acute; corolla scarlet, glabrous. July. S. C. to Fla. and Texas, Mex., W. Indies, Trop. Amer., and cult. and occasionally escaped in India and Austral.—Probably all of the material grown as this is not true to name, possibly the larger part of it is in reality *S. splendens.* Var. **bícolor,** Hort., has the upper lip white, the lower lip brilliant carmine-red. Var. **làctea,** Hort., has white fls. Var. **màjor,** Regel (*S. filamentòsa,* Tausch. *S. Roemeriàna,* Hort., not Scheele), becomes a subshrub up to 4½ ft. high, is apt to be less canescent-pubescent and has larger bright scarlet-red fls. June to late autumn. Gt. 7:232. Var. **nàna,** Hort., is a dwarf much-branched form. Var. **nàna carmínea,** Hort., is offered in the trade. Var. **nàna compácta,** Hort., is a dwarfer and more bushy form than the variety proper.

Var. **pseùdo-coccínea,** Gray (*S. pseùdo-coccínea,* Jacq.), grows 2–4 ft. high, and has the st., petioles, and often the margins of the floral lvs. conspicuously beset with hirsute hairs. Mex. and Cent. Amer. B.M. 2864.

3539. Salvia splendens. No. 32.

J.F. 2:35. Var. **punícea,** Hort. (*S. coccínea* var. *spléndens,* Hort. *S. supérba,* Hort.), differs from the type in being larger, slenderer and later-flowering and in having fls. of a brighter red, more velvety and more closely placed. Var. **punícea nàna,** Hort., differs from the variety proper in being dwarfer and the twigs more branched. Var. **ròsea nàna,** Hort., is offered in the trade. Var. **spléndens,** Hort., equals var. *punícea,* Hort.

44. **longístyla,** Benth. (*S. aristulàta,* Mart. & Gal.). Plants reaching a height of 14–15 ft.: sts. herbaceous(?), erect, tomentose-villous: lvs. petiolate, broad-ovate, 3–5½ x 2–4½ in., acuminate, crenate, the base broad-cordate, rugose, both surfaces soft pubescent-villous; floral lvs. ovate, long-acuminate, ciliate, deciduous: racemes 15–25 in. long; floral whorls 6–16-fld.; calyx elongate-tubular, base striate, soft-pubescent, the teeth long setaceous-acuminate; corolla red-pink, long-exserted, rather more than 1 in. long. Mex. B.M. 8590.

Hastatæ.

45. **pàtens,** Cav. Half-hardy perennial, 1–2½ ft. high: sts. herbaceous, erect, pilose: lvs. petiolate, ovate-

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deltoid, crenate, base hastate or in the upper lvs. rotund, both surfaces hispid; floral lvs. lanceolate-linear: floral whorls few, remote, with large fls.; calyx campanulate, villous, the teeth setaceous-acuminate; corolla blue, 2 in. or more long, the tube broad. Sept. Mountains of Mex. B.M. 3808. B.R. 25:23. B. 3:109. F. 1840:222. F.S. 5:503. P.M. 6:1. R.B. 26:85. R.H. 1909:156. H.U. 1, p. 39.—The most commonly cult. blue salvia. Var. **álba,** Hort., differs only in having white fls. F.S. 5:503. Var. **compácta nàna,** Hort., is offered in the trade. Var. **lilácina,** Hort., has lilac-blue fls.

46. **cacaliæfòlia,** Benth. Tender perennial: sts. herbaceous, erect, about 3 ft. high, pubescent: lvs. petiolate, broad-deltoid, the base angulate, broad subhastate-cordate, rather thick, pubescent above, reddish or whitish and soft-villous beneath; floral lvs. small: racemes branched; floral whorls 2-fld.; calyx campanulate, pilose, the teeth aristate-acuminate; corolla deep blue, pubescent, the tube very broad. June. Mex. B.M. 5274. F.S. 22:2318. Gn. 21:328.

Subgenus IV. LEONIA.

Section 8. Echinosphace.

47. **carduàcea,** Benth. Fig. 3535. Perennial, 1 ft. or more high: sts. herbaceous, erect, subsimple, white-lanate: lvs. petiolate, pinnatifid, laxly lanate beneath, the lobes ovate, sinuate-dentate, with spiny, acuminate teeth; floral lvs. and bracts imbricate, very spiny: floral whorls remote, densely many-fld.; calyx inflated, lanate; corolla lilac, the midlobe of the lower lip fimbriate. July. Calif. B.M. 4874. G.C. II. 19:56. Gn. 65, p. 365; 70, p. 238. A.G. 25:589.—A unique species on account of its thistle-like foliage.

Section 9. Pycnosphace.

48. **columbàriæ,** Benth. Half-hardy annual: st. erect, slightly branched, 6–12 in. high: lvs. deeply pinnatifid, wrinkled, rather glabrous, the lobes oblong-linear, obtuse, erose-dentate or incised; floral lvs. bract-like: floral whorls solitary or 2, capitate, far remote from the cauline lvs., densely many-fld., hemispherical; bracts broad-ovate, membranaceous, acuminate; calyx ovate, pubescent; corolla blue, the midlobe of the lower lip crenulate. Summer. Calif. and adjacent Mex. B.M. 6595 (fls. lilac).—Not showy and apparently not in common cult.

Section 10. Heterosphace.

A. *Lvs. lyrate*.....49. **lyrata**
AA. *Lvs. pinnatifid, they or the terminal lft. roundish or reniform-cordate*.....50. **Roemeriana**

49. **lyràta,** Linn. Hardy perennial with a thickened root: sts. herbaceous, erect, 8–24 in. high, subsimple, pilose: radical lvs. 2–3 in. long, lyrate, erose-dentate, both surfaces hispidulous; cauline lvs. few, oblong-lanceolate, the base long-narrowed; floral lvs. oblong-linear: racemes subsimple, interrupted; floral whorls 6-fld., lax, distant; calyx tubular-campanulate, nodding, pilose; corolla blue-purple, about 1 in. long. May and June. Conn. to Ill., south to Fla. and Texas.—Not frequent in cult.

50. **Roemeriàna,** Scheele (*S. porphyrántha,* Decne. *S. porphyràta,* Hook.). Perennial, 1–2 ft. high: sts. sparsely long, spreading, hirsute: lvs. or terminal lft. roundish or reniform-cordate, coarsely repand-toothed or crenately incised; lower lvs. usually with 2 or 3 similar but smaller (subsessile or slender-petiolulate) lfts.; floral lvs. mostly shorter than the pedicels: raceme loose and elongated; floral whorls few-fld.; calyx somewhat pubescent; corolla deep scarlet, puberulent, about 1 in. or more long, tubular-funnelform. July. Texas and Mex. B.M. 4939. F.S. 11:1080. R.H. 1854:301.

Section 11. Notiosphace.

51. **japónica,** Thunb. Perennial subshrub, about 1½ ft. high: sts. herbaceous, erect, branched, glabrous: lvs. 3–4 in. or more long, petiolate, pinnatisect, the segms. ovate, acuminate, the base narrowed, incise-dentate or pinnatifid, glabrous; floral lvs. lanceolate: racemes 4–5 in. long, many-fld., subsimple; floral whorls distinct, about 6-fld.; calyx tubular-campanulate, glabrous, striate; corolla dark lilac or blue(?), the tube scarcely exserted. Japan. Var. **álba,** Hort., is a white-fld. form.

Section 12. Hemisphace.

52. **verticillàta,** Linn. Perennial, 2–3 ft. high: sts. herbaceous, erect, pilose-hispid: lvs., the base cordate, lyrate, the uppermost lobe the largest, ovate-rotund or entire, sinuate-crenate, both surfaces hispid or lanate; floral lvs. deflexed and bract-like: racemes branched, often a foot or more long; floral whorls 20–40-fld., remote; calyx villous, corolla lilac-blue, the tube included. July and Aug. Eu., Asia Minor and Caucasus region.

The following species have been in cult. or are not sufficiently known to be classified: *S. amàna,* Sims=S. lamiifolia.—*S. angustifòlia,* Cav. (Sec. 7). Perennial herb, about 2 ft. high, with subsessile oblong-linear lvs.: calyx often bluish; corolla blue. Mex. B.R. 1554.—*S. arbòrea,* Hort., is offered in the American trade, as like the scarlet sage, but growing in a tree-like form. Possibly only a variant of S. splendens.—*S. asperàta,* Falc. (Sec. 5). Stout herb, about 2 ft. high, with broad subcordate-ovate lvs.: corolla yellowish white. Himalaya. B.M. 4884.—*S. austriaca,* Linn. (Sec. 6). Perennial herb, about 2–3 ft. high, with broad-ovate lvs.: corolla yellowish, the upper lip spotted red. S. Eu. B. R. 1019.—*S. boliviàna,* Planch. (Sec. 7). Subshrub about 4 ft. high, with ovate-cordate lvs.: calyx dull purple or green and purple; corolla bright scarlet, 3 in. long. Bolivia. B.M. 6714. F.S. 11:1148.—*S. Cámertonii,* Regel (Sec. 7). Subshrub, 3–5 ft. high, with ovate or cordate-ovate lvs.: corolla brownish purple, 1 in. long. Probably Mex. Gt. 4:180. Considered by some as probably the same as S. elegans.—*S. camphoràta,* Hort., is offered in the trade.—*S. candidissima,* Vahl (S. odorata, Willd.) (Sec. 5). Subshrub or herb, about 3 ft. high, with ovate, lanceolate or orbicular lvs.: corolla white. Orient.—*S. canéscens,* Mey. (Sec. 5). Sts. herbaceous, 2 ft. high, white-lanate at base: lvs. lanceolate-oblong, entire or sinuate-lobate: corolla purple. Caucasus. B.R. 24:36.—*S. Celoviàna,* Hort. Shrubby, with dark bronze-green foliage: corolla reddish violet. Hardy in S.W. England and Ireland. Botanically unknown.—*S. ceratophýlla,* Linn. (Sec. 5). Sts. herbaceous, white-lanate at base: lvs. deeply pinnatifid, 7–8 in. long, with linear lobes, both surfaces lanate: corolla about 1 in. long, yellowish white. Orient and Asia Minor. F.C. 1:5.—*S. chamædryoides,* Cav. (Sec. 7). Subshrub about 1 ft. high, with ovate-oblong lvs. which are hoary-tomentose beneath: calyx often purplish; corolla blue, the lower lip very broad. Mex. B.M. 808. L.B.C. 6:576.—*S. confertiflòra,* Pohl (Sec. 7). Subshrub, about 3 ft. high, with ovate-oblong lvs., base cuneate: racemes elongated, up to 2 ft.; floral whorls numerous, many-fld.; calyx reddish; corolla small, not gaping, reddish inside, yellowish or reddish outside, covered with yellow wool. Brasil. B.M. 3899. H.U. 3, p. 203.—*S. confùsa,* Benth. (S. interrupta, Hort., not Schousb.) (Sec. 1). Hardy shrub, about 4 ft. high, with tomentose-pubescent branches: lvs. interrupted pinnatisect, white-lanate beneath: calyx colored, striate and pubescent; corolla whitish. S. Eu.—*S. discolor,* HBK. (S. mexicana minor, Hort.) (Sec. 7). Shrub, 2–3 ft. or more high, with ovate-lanceolate lvs.: spikes 8–9 in. long; calyx striate; corolla shining violet. Mountains of Peru. B.M. 6772. G.C. II. 19:341.—*S. élegans,* Vahl (Sec. 7). Perennial herb, 3–4 ft. high with ovate acuminate serrate lvs. hispidulous pubescent or tomentose above, glabrous beneath: corolla blood-red, more than 1 in. long. Mex. and Guatemala. B.M. 6448.—*S. eriócalyx,* Bert. (Sec. 7). Shrub with divaricate hoary-pubescent branches: lvs. oblong-lanceolate: racemes simple and short: calyx densely lanate, frequently reddish; corolla white. Japan. R.H. 1844:1.—*S. flàva,* G. Forest. Plant, 8–20 in. high: sts. ascending, erect, more or less pilose above: basal lvs. long-petiolate, 1¼–6½ x 1–3¼ in., hastate-triangular or hastate-ovate, more or less pilose on both surfaces, crenate, double crenate, or crenate-serrate: racemes composite; floral whorls 4–8, subremote, generally 4-fld.; calyx pilose; corolla canary-yellow with purple markings, about 2½ in. long; galea slightly lanuginose. W. China.—*S. Forsk̀ohlei,* Linn. (Sec. 3). Hardy perennial, 1½ ft. high: st. herbaceous, somewhat viscous-villous: lvs. broad-ovate: corolla violet. Orient. B.M. 988.—*S. Gardneriàna,* Hort., is offered in the trade.—*S. globòsa,* Hort. Biennial: lvs. in a flattened rosette 16–18 in. long, 10–12 in. broad, deeply cut, clothed with a silvery white tomentum: fl.-st. 3 ft. or more high, much branched, the branches forming a sphere: fls. large, white. Asia Minor. R.B. 37: 28.—*S. Greigii,* Hort., is offered in the trade as a wooded shrub 2½–3 ft. high: fls. a soft shade of cerise, produced all summer. G.M. 57:713.—*S. Heèrii,* Regel (Sec. 7, probably). Subshrub, 2–5 ft. high, with cordate-ovate or lanceolate lvs.: corolla scarlet. Peru. Gt. 4:115.—*S. índica,* Linn. (Sec. 5). Perennial herb, about 3 ft. high, with broad or oblong-ovate lvs., the floral ones ovate-cordate, reflexed: corolla yellow spotted with purple. Syria. B.M. 395.—*S. interrúpta,* Schousb. (Sec. 1). Hardy subshrub, 3–4 ft. high, with

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irregularly pinnatisect lvs., the extreme segm. much larger than the others: corolla showy, dark violet-purple with a white throat. Morocco. B.M. 5860.—*S. lamiifòlia*, Jacq. (S. amœna, Sims) (Sec. 7). Shrub, about 2 ft. high, with ovate, serrate-crenate lvs.: corolla blue, the upper lip covered with whitish blue wool. W. Indies. B.M. 1294. B.R. 446. L.B.C. 4:377.—*S. lavenduloides*, HBK. (S. lavenduliformis, Neum.) (Sec. 7). Perennial herb, with very short-petioled, oblong-lanceolate lvs.: spikes 2–3 ft. long; corolla pale blue, small. Mex. R.H. 1845:445.—*S. leonuroides*, Glox. (S. formosa, L'Her.) (Sec. 7). Shrub, about 3 ft. high, with ovate or rhomboid lvs.: the floral whorls in the axils of the cauline lvs. not racemose; corolla scarlet. Peru and Brasil. B.M. 376.—*S. macrostàchya*, HBK. (Sec. 7). Shrub, about 6 ft. high, with subrotund-ovate lvs., their base deeply cordate, the auricles rounded; the floral lvs. large, green; corolla blue, the lower lip longer than the galea. Peru. B.M. 7372. —*S. oaxacàna*, Fern. (Sec. 7). Shrub, much branched: lvs. ovate, pale green and strongly rugose above, white-tomentose beneath: floral whorls mostly 2-fld.; corolla cardinal-red, nearly 1¾ in. long. Mex.—*S. oppositiflòra*, Ruiz & Pav. (Sec. 7). Half-hardy subshrub, about 2 ft. high, with ovate, pubescent lvs.: floral whorls 2-fld., secund, calyx striate; corolla scarlet. F.S. 4:345. P.M. 15:53. Gt. 4:212.—*S. prínceps*, Hort. (Sec. 7). Subshrub, 3–6 ft. high: lvs. large, ovate-serrate, with the principal veins prominent: spikes large, terminating the branches; calyx colored; corolla brilliant carmine-rose, slightly ventricose, lfts. small. Mex. R.B. 33:257. Resembles S. splendens. —*S. prunelloides*, HBK. (S. brunellodes, Voss) (Sec. 7). Several herbaceous sts. from a perennial base: lvs. ovate-oblong, both surfaces green: corolla blue. Mex. P.M. 11:175. Var. *purpùrea*, Hort., has the fls. purplish red.—*S. rùtilans*, Carr. (Sec. 7). A plant with a small green calyx and usually 2-fld. floral whorls. Probably a horticultural form of S. splendens. R.H. 1873:250. G.C. II. 15:117(?).—*S. scabiosæfòlia*, Lam. (S. Habliziana, Willd.) (Sec. 1). Perennial herb, 1–1½ ft. high, with pinnatisect lvs.: segms. 3–5-jugate, frequently in pairs or 3's: corolla white. Tauria. B.M. 1429 and 5209.—*S. scapiformis*, Hance (Sec. 11). Perennial herb: lvs. radical, broadly ovate or oblong-cordate: scapes 6–10 in. high; the floral whorls numerous; corolla amethystine. Formosa. B.M. 6980.—*S. Siehedna*, Hort., is described as perennial, and having large light lilac fls.—*S. Soùliei*, Duthie. Perennial, about 2 ft. high: sts. herbaceous: lvs. dark green, triangular, rugose: fls. numerous, tubular-lipped, delicate shade of blue. China.—*S. strictiflòra*, Hook. (Sec. 7). Shrub, about 2 ft. high, with ovate; pale green, slightly fleshy lvs.: fls. stiffly erect, tubular and golden red. Peru. B.M. 3135. P.M. 11:247.—*S. taraxacifòlia*, Coss. & Bal. (Sec. 1). Subshrub, 6–18 in. high, with lvs. 2–4 in. long, pinnatisect, terminal lobe 1–1½ in. long, ovate and irregularly sinuate-toothed, all white-tomentose beneath: corolla pale pink with a yellowish disk to the lower lip and a purple-speckled palate. Morocco. B.M. 5991.—*S. tricolor*, Lem. (Sec. 7). Half-hardy shrub, about 2 ft. high, with small ovate lvs. rounded-obtuse at the apex, with a terminal tooth: corolla white, the lower part of the large lower lip reddish. Mex. I.H. 4:120. F.S. 12:1237.

F. Tracy Hubbard.

SALVÍNIA (Antonio Maria Salvini, 1633–1729, Italian scientist). *Marsiliàceæ*. An interesting plant for the small home aquarium. Salvinia is a genus of fern-allies found mostly in the tropics and comprising about a dozen species, only one of which, *S. natans*, Linn. (Fig. 3540), is cultivated.

Plants floating, with slender sts. bearing apparently 2-ranked, oblong lvs. 4–6 lines or even 1 in. long: upper surface of lvs. covered with papillæ or minute warts; lower densely matted with brown pellucid hairs. The plant is supposed to have no true roots. What look like roots are believed to be finely dissected lvs.; one of these occurs with each pair of the foliage-lvs. Many aquatic plants have these 2 types of foliage, e. g., the water buttercup, *Ranunculus aquatilis*. Salvinia looks much like a flowering plant but it is a spore plant and has 2 kinds of spores, large ones and minute ones. These spores are produced in small oval bodies known as sporocarps, i. e. "spore-fruits." Of each cluster of sporocarps, 1 or 2 contain 10 or more sessile macrosporangia, each of which contains a solitary macrospore. The other sporocarps in the cluster contain numerous microsporangia, each of which contains numerous microspores.

3540. Salvinia natans. (×about 1)

The plant is of easy culture in summer, but many persons have lost it over winter by not understanding its habits. It is an annual and often dies in the winter after ripening a crop of spores. Secure a broad pan, fill it half full of loam and then fill the pan with water. After the water has cleared place the salvinias on the surface. In the winter watch for the formation of the spore-capsules. These grow in masses near the top of the clusters of root-like leaves. After the plants die the spore-capsules will remain in the soil. The plant often passes the winter in greenhouses in a growing condition, producing no spores.

R. C. Benedict.†

SAMANÈA (a corruption of its native Spanish name of *zaman*). *Leguminòsæ*. Spineless or rarely spiny trees or shrubs of the American tropics, where one or two of them are much planted for shade.

3541. Samanea Saman.

Leaves several- or rarely many-pinnate; lfts. 1- to many-pinnate: fls. in globose heads: pods straight or somewhat curved, rigid, more or less constricted, flat, thickened or subterete, leathery or fleshy, indehiscent or rarely but slightly so; septate between the seeds. Distinguished from Enterolobium by the nearly straight pods and from Pithecolobium by its indehiscent septate pods.—About 30 species.

A. *Lvs. 2–4-pinnate; lfts. 2–8-pinnate.*

Samán, Merrill (*Mimòsa Samán*, Jacq. *Pithecolòbium Samán*, Benth. *Enterolòbium Samán*, Prain). Rain Tree. Zaman. Saman. Figs. 3541, 3542. A large tree, reaching a height of 60–80 ft., with wide-spreading branches; branchlets velvety pubescent: lvs. 2–4-pinnate; lfts. 2–8-pinnate, oblique, ovate-oblong or suborbicular, up to 1½ in. long, shining above, pubescent beneath: peduncle 4–5 in. long: fls. in heads, in short pedicels; calyx ¼in. long, pubescent; corolla about ½in. long, yellowish; silky, villous; stamens 20, light crimson, shortly connected: pod sessile, straight, thick-margined, leathery-fleshy, glabrous, indehiscent, 6–8 in. long, ½–1 in. broad, flattened or subterete. A native of Cent. Amer. and the W. Indies, but now widely distributed in the tropics as an ornamental shade tree. Blanco, Fl. Filip. 309. Jacq. Fragm. 9. G.C. III. 11:557.—The lfts. fold together on the approach of rain. A rapid grower. The pods contain a rich sugar-pulp and are eagerly eaten by cattle and horses. The seeds are of little food value as they are not digested and often cause slight digestive troubles. The pods when eaten by cows are said to increase the quality of their milk.

AA. *Lvs. 5–12-pinnate; lfts. 20–30-pinnate.*

arbòreum, Ricker (*Mimòsa arbòrea*, Linn. *Mimòsa filicifòlia*, Lam. *Pithecolòbium filicifòlium*, Benth. *Pithecolòbium arbòreum*, Urban). A magnificent tree, 50–75 ft. tall, ferruginous-tomentose: lvs. 8–12-pinnate; lfts. 20–30-pinnate, oblique, falcate-oblong, obtuse, ¼–⅓in. long, glabrescent: peduncles axillary or above the axils, 2–3 in. long: fls. white, sessile in globose heads, often pubescent; calyx 1 line long, corolla ¼in. long: pod red, tomentose when young, becoming glabrous, terete, fleshy, constricted between the seed, slightly curved or twisted, 2–3 in. long, ⅓–½in. broad, finally somewhat dehiscent; seeds black. Trop. Amer.

P. L. Ricker.

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SAMBÙCUS (old Latin name for the elder, also spelled *Sabucus*). *Caprifoliàceæ*. ELDER. Ornamental mostly woody plants grown for their handsome foliage, showy clusters of white flowers, and the attractive red or black berries.

Deciduous shrubs or small trees, with stout very pithy branches, rarely perennial herbs: lvs. opposite, odd-pinnate, with serrate lfts., with or without stipules and stipels: fls. small, usually perfect, white, in terminal compound cymes or panicles, usually 5-merous, rarely 3- or 4-merous; calyx-lobes minute; corolla rotate with short tube and oval to oblong-lanceolate lobes; stamens with short filaments; ovary inferior, 3–5-celled; style short, 3–5-lobed: fr. a drupe with 3–5 1-seeded nutlets.—About 20 species in the temperate and subtropical regions of both hemispheres. Some species, particularly *S. nigra* and *S. canadensis*, possess medicinal properties; the fr. of these species and also that of *S. cærulea* is used in cookery, also elderberry wine is made from it. The hard wood, the large pithy shoots which are easily hollowed and the pith are put to various uses. Monograph of the genus by Count Schwerin in M.D. 1909, pp. 1–56.

The elders are large and rather coarse shrubs, rarely tree-like, or perennials spreading by suckers, with pinnate foliage and large flat or panicled clusters of white or creamy white small flowers followed by red or black, rarely glaucous or in some varieties green or yellow fruits. They are well adapted for mass planting and are very effective as well in bloom as in fruit in their proper places. They prefer rich and humid soil and most species are hardy North; *S. cærulea* and its var. *neo-mexicana* are hardy at least as far north as Massachusetts. Propagation is by seeds which germinate readily and by hardwood and greenwood cuttings, also by root-cuttings; the perennial species and also *S. canadensis* by suckers.

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3542. Samanea Saman. (×¼)

A. *St. woody.*

B. *Berries black or dark purple, rarely green or white: pith white: cymes flat.*

C. *Fr. not glaucous.*

1. **nìgra,** Linn. EUROPEAN ELDER. Large shrub or tree, to 30 ft., with deeply furrowed bark: all parts when bruised exhaling a disagreeable odor: branches gray, strongly lenticellate: lvs. dark green, usually pubescent beneath while young; lfts. 3–7, usually 5, short-stalked, elliptic, acute, serrate, 2–6 in. long: cymes 5-rayed, to 5 in. across: fr. black, lustrous, 3-celled, ¼–⅓in. across. May, June: fr. Aug., Sept. Eu., W. Afr., W. Asia. S.E.B. 4:637. R.F.G. 12:780. H.W. 3, p. 132. G.C. III. 10:405. Many varieties: Var. **pyramidàta,** Lav. (var. *pyramidàlis*, Dipp.). Habit columnar. Var. **péndula,** Dipp. Pendulous or prostrate. Var. **nàna,** Schwerin. Forming a globose bush about 3 ft. high; weak-growing. Var. **rotundifòlia,** Endl. Lfts. 3, rarely 5, broadly ovate to suborbicular. Var. **laciniàta,** Willd. (*S. laciniàta*, Mill.). Lfts. regularly and finely dissected. R.F.G. 12:780. A handsome and distinct form. Var. **heterophýlla,** Endl. (var. *linearis*, Kirchn.). Lfts. irregularly cut and erose and partly reduced to the midrib; slow-growing form. Var. **latisécta,** Hesse. Lvs. broadly lobed. Var. **álbo-variegàta,** Endl. Lvs. variegated with white. J.H.S. 33, p. 360, fig. 47. G.W. 11, p. 474. Var. **pulverulénta,** Sweet. Lvs. finely dotted and sprinkled with white. Var. **aûrea,** Sweet. Lvs. golden yellow. G.W. 2, p. 565. Var. **víridis,** Ait. (var. *chlorocárpa*, Hayne. Var. *viréscens*, Sweet). Fr. pale green, striped whitish. M.D. 1908:8, fig. 2.

2. **canadénsis,** Linn. AMERICAN or SWEET ELDER. Fig. 3543. Shrub, to 12 ft., stoloniferous: branches pale yellowish gray, slightly lenticellate: lvs. bright green; lfts. usually 7, short-stalked, elliptic to lanceolate, acute or acuminate, sharply serrate, sometimes pubescent on the veins beneath, 2–5 in. long: cymes 5-rayed, to 10 in. across: fr. purplish black, usually 4-celled. June, July; fr. in Sept. Nova Scotia and Man. to Fla. and Texas. B.B. (ed. 2) 3:268. G. 27:541. M.D.G. 1899:169. Var. **submóllis,** Rehd. Lvs. grayish green and soft-pubescent beneath. Ill. to Ark. and Texas. Var. **máxima,** Hesse. Lvs. larger: cymes to 18 in. across. Very vigorous grower. G.W. 11, p. 397. G.M. 51:451. Var. **acutíloba,** Ellwanger & Barry (var. *laciniàta*, Cowell). Lvs. much dissected, the lower lfts. pinnatifid, the upper ones incisely serrate and narrowly lanceolate. A very handsome and distinct form. F.S.R. 1, p. 151. Var. **aûrea,** Cowell (var. *delicatissima*, Schwerin). Lvs. golden yellow: berries cherry-red. F.E. 22:433. Var. **chlorocárpa,** Rehd. Fr. greenish: lvs. pale yellowish green.—The handsomest and most effective of the elders in bloom, also attractive when weighed down with its large clusters of purplish black berries.

CC. *Fr. glaucous.*

3. **cærùlea,** Raf. (*S. glaùca*, Nutt.). Large shrub or small tree, occasionally to 50 ft.: branchlets rather slender, bloomy when young: lfts. 5–7, oblong, long-acuminate, coarsely serrate, the lower lfts. often 3-parted or pinnate, bright green, glabrous, 2–6 in. long: fls. yellowish white, in flat cymes 4–6 in. wide: fr. subglobose, ¼in. thick, blue-black, whitened by a thick bloom. June, July; fr. in Aug. and Sept. Brit. Col. to Calif., east to Mont. and Utah. S.S. 5:222. G.W. 8:116. Var. **velùtina,** Schwerin (*S. velùtina*, Durand). Young branchlets and lvs. covered with a dense and short whitish pubescence. Calif. Var. **neo-mexicàna,** Rehd. (*S. glaùca* var. *neo-mexicàna*, A. Nels. *S. intermèdia*, Carr.). Lfts. 3–5, narrow-lanceolate, gravish green, slightly pubescent beneath. New Mex., Ariz. M.D. 1909:8, fig. 1.—This species is similar to *S. canadensis*, but habit looser and taller, very striking with its large clusters of bluish white frs.; the typical

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form and var. *neo-mexicana* have proved hardy as far north as Mass.

BB. *Berries red, rarely yellow: pith light brown: cymes convex or paniculate.*

4. **racemòsa,** Linn. RED-BERRIED ELDER. Shrub, to 12 ft.: branches light brown; young branchlets glabrous or nearly so, 2–3½ in. long: infl. ovate or oblong, dense: lfts. 5–7, ovate or elliptic to ovate-lanceolate, glabrous, 2–3 in. long: fls. yellowish white: fr. scarlet, ¼in. across, 3-seeded; nutlets yellowish white, minutely rugose. April, May; fr. in June, July. Eu. to E. Asia. H.W. 3, p. 133. R.F.G. 12:781. Var. **nàna,** Carr. Dwarf compact form. Var. **plumòsa,** Carr. Lfts. incisely serrate to about the middle, teeth long and

3543. Sambucus canadensis. (×⅓)

narrow, purplish when unfolding. Var. **plumòso-aùrea** Weezelenburg (var. *serratifòlia aùrea,* Barbier). Foliage like that of the preceding form, but golden yellow. Var. **ornàta,** Carr. (var. *pteridifòlia,* Carr.). The first lvs. of the shoot are like those of var. *plumosa,* the later ones more finely dissected like var. *laciniata.* Var. **laciniàta,** W. Koch (var. *serratifòlia,* Hort.). Lfts. regularly and deeply dissected, green when unfolding. R.F.G. 12:781. Var. **tenuifòlia,** Carr. Lvs. finely and deeply dissected with very narrow segms., purplish when unfolding. Var. **purpùrea,** Sweet (*S. rosiflòra,* Carr.). Fls. purplish or pink outside, purple in bud. G. 3:175. Var. **flavéscens,** Sweet (var. *xanthocárpa,* Zabel). Fr. yellow with orange cheek. M.D. 1909:8, fig. 6.—This species, like the following, is not conspicuous in bloom, but the clusters of scarlet fr. are very attractive in June and July. The cut-leaved forms are very graceful.

5. **pùbens,** Michx. (*S. pubéscens,* Pers. *S. racemòsa* var. *pùbens,* Koehne. *S. racemòsa* var. *pubéscens,* Dipp., not Miq.). Shrub, to 12 or sometimes to 25 ft.: branchlets and lvs. on both sides finely pubescent while young, sometimes nearly glabrous at maturity; lfts. 5–7, ovate-oblong to oblong-lanceolate, acute, serrate, pubescent beneath, rarely nearly glabrous: infl. ovate or pyramidal, looser and broader at the base than that of the preceding species, to 4 in. long: berries scarlet; nutlets minutely rugose. May: fr. in June, July. New Bruns. to Alaska, south to Ga., Colo. and Brit. Col. B.B. (ed. 2) 3:268. Var. **dissécta,** Brit. (*S. racemòsa* var. *laciniàta,* Rob. & Fern., not W. Koch). Lfts. deeply and regularly dissected. Var. **leucocárpa,** Bernh. (var. *albicócca,* Brit. Var. *xanthocárpa,* Cock.). Fr. whitish or amber-yellow. Var. **arboréscens,** Dipp. Tree-like; less pubescent.

AA. *St. herbaceous: plant stoloniferous: cymes flat: fr. red.*

6. **Schweiniàna,** Rehd. Herbaceous or suffruticose, stoloniferous, glabrous, 3–5 ft.: lfts. 5–7, oblong-lanceolate, the lower ones short-stalked, the upper ones adnate and decurrent, acuminate, very unequal at the base, serrate, 3–5 in. long: cymes flat, long-stalked, 5-rayed, puberulous: fr. salmon-red, 3-seeded, ⅙in. thick; nutlets broadly ovoid, smooth. W. China.—Handsome with its clusters of bright red fruit; it spreads rapidly by suckers and may become a weed difficult to eradicate, therefore it should not be planted where it is likely to become troublesome.

S. callicárpa, Greene (S. leiosperma, Leiberg. S. racemosa var. callicarpa, Jepson). Allied to S. pubens: shrub to 10 ft.: lfts. oblong to lanceolate, pubescent on the veins beneath while young: infl. broadly pyramidal or hemispherical: nutlets smooth. Alaska to Calif., Japan. M.D. 1909:8, fig. 5. G.F. 10:175. Mn. 2:21 (as S. pubens). —*S. chinénsis,* Lindl.=S. javanica.—*S. Ébulus,* Linn. Herbaceous, stoloniferous, to 5 ft.: lfts. 5–9, elliptic-lanceolate, serrate, pubescent; stipules large: cymes flat, 3-rayed; fls. white or pinkish, anthers purple, fragrant: fr. black, ¼in. across. Eu., Afr., W. Asia. R.F.G. 12:779. S.E.B. 4:638.—*S. Fontenàysii,* Carr. (S. cærulea × S. nigra). Intermediate between the parents: lvs. bluish green: cymes large: fr. black, bloomy. Garden origin.—*S. javánica,* Reinw. (S. chinensis, Lindl. S. Thunbergiana, Blume). Suffruticose, to 6 ft.: lfts. 5–7, elliptic-lanceolate, the upper ones sometimes decurrent, long-acuminate, sparingly pubescent while young, to 8 in. long: cymes flat, 5–6 in. across, with scattered large aborted fleshy fls.: fr. ovoid, red. Japan, China to Malay Archipelago.—*S. leiospérma,* Leiberg=S. callicarpa.—*S. melanocárpa,* Gray. Allied to S. pubens. Shrub, to 12 ft.: lfts. oblong-lanceolate, pubescent beneath while young, 4–5 in. long: infl. ovate: fr. ¼in. thick, black, rarely reddish brown. Brit. Col. to Calif. G.F. 10:135. M.D. 1909:8, fig. 4. I.T. 5:173.—*S. mexicàna,* D.C. (S. canadensis var. mexicana, Sarg.). Tree, to 30 ft.: lvs. 5–9-foliolate, sometimes bipinnate; lfts. ovate-lanceolate, long-acuminate, pubescent on both sides while young, later only below, 2–6 in. long: cymes flat, 6–8 in. across: fr. nearly black, ribbed, ¼in. across. W. Texas to S. Calif., Mex. S.S. 5:221. In Mex. planted sometimes near houses as a shade-tree and for its fr. —*S. microbótrys,* Rydb. Allied to S. pubens. Shrub, to 6 ft., glabrous: lfts. ovate-lanceolate, long-acuminate, to 5 in. long: infl. small, nearly hemispherical, about 2 in. long: fr. scarlet. Calif. to Colo. and Nev.—*S. Sieboldiàna,* Graebn. (S. racemosa var. Sieboldiana, Miq.). Closely related to S. racemosa: lfts. oblong-ovate to lanceolate, smooth, not rugulose above, more finely serrate, to 4 or occasionally to 8 in. long: fls. and frs. smaller. Japan, China. S.I.F. 2:74 (as S. racemosa).—*S. Simpsonii,* Rehd. Allied to S. canadensis. Small tree, to 15 ft., with deeply furrowed bark: lfts. usually 5, elliptic to elliptic-oblong, lustrous above, glabrous, 1½–3 in. long: cymes with 4 or 5 rays, the central ray as long or longer than the lateral rays: ovary 5-celled. Fls. S.T.S. 2:175.—*S. Thunbergiàna,* Blume=S. javanica. The plant cult. under this name is S. racemosa or possibly sometimes S. Sieboldiana.

ALFRED REHDER.

SAMPHIRE (*Crithmum maritimum,* which see) is the name corrupted from *sampier,* itself a corruption of the French *Saint Pierre* (St. Peter), given to a succulent-stemmed half-hardy perennial, well known as sea-fennel, parsley-pert, and St. Peter's herb upon rocky coasts above high tide in Great Britain. It belongs to the family *Umbelliferæ.* The plants, which attain a height of 1 to 2 feet, have somewhat linear glaucous-green fleshy leaves, ½ inch long, small white or yellowish flowers, which appear in umbels during July, and oblong yellowish fennel-like smallish seeds of light weight, which ripen in early autumn and lose their germinating power within a year. For more than three centuries the crisp and aromatic leaves and young stems gathered in August or September have been used in salads and vinegar pickles. Samphire rarely reaches perfection in gardens far from the seacoast, unless

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CII. Sambucus canadensis, the American sweet or summer-flowering elder

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grown upon sandy or gravelly soil, and watered frequently and plentifully with weak salt- and soda-solutions. It may be propagated by root-division, but better by sowing the seed as soon as ripe, the plants being thinned to stand from 1 to 1½ feet asunder in rows 2 to 2½ feet apart.

Golden samphire (*Inula crithmifolia*), a native of the marshes and seacoast of Great Britain, is an erect hardy perennial, 1 to 1½ feet tall, with small, fleshy leaves and yellow flowers in small, umbel-like clusters. Though grown and used like true samphire, for which it is often sold, it lacks the pleasing, aromatic taste of the genuine. It belongs to the family *Compositæ*.

For marsh samphire, see *Salicornia*. M. G. KAINS.

SAMUÈLA (Sam Farlow Trelease, who participated in field-studies of the species). *Liliàceæ*, tribe *Yúcceæ*. Yucca-like large plants.

Short-trunked mostly unbranched soft-pulped trees, resembling the baccate yuccas except in their gamophyllous perianth which in one species has a long slender tube resembling a tuberose. As in *Yucca Treculeana*, but to a greater extent, the bracts of the ample panicle are long and add much to its attractiveness.—Two species, one Texan and the other of the Mexican tableland. Hardy only in the S. where, as in Calif. and along the Riviera, they are said to be beginning to be cult. Monograph by Wm. Trelease in Rept. Mo. Bot. Gard., vol. 13, pp. 116–19.

Faxoniàna, Trel. Lvs. in a dense round head, 2–3 in. wide and 3 ft. long, nearly smooth, deeply concave, pungent, with long coarse curving white marginal fibers: infl. loosely branched, 3 ft. or more long; fls. white, 2–4 in. across, with conical tube about ⅓in. long: fr. 1 by mostly 2–3 in. S. W. Texas. Rep. Mo. Bot. Gard. 4:4, 5; 13:73–5, 82, 85. S.S. 10:499.

carnerosàna, Trel. Infl. 5–6 ft. high, compactly branched, with very large white bracts; fls. white, 3–4 in. across, with cylindrical tube ½–1 in. long: fr. 1½ x 2–3 in. E. Mex. Rep. Mo. Bot. Gard. 13:76–9, 80, 85, 87, and frontispiece to p. 27. WILLIAM TRELEASE.

SANCHÈZIA (after Jos. Sanchez, professor of botany at Cadiz). *Acanthàceæ*. Showy warmhouse plants, grown for flowers and foliage.

Strong erect herbs or half-shrubby plants: lvs. large, opposite, entire or slightly toothed: fls. orange, red, or purple, united into heads or spikes at the ends of the branches, or rarely paniculate; calyx deeply 5-parted, segms. oblong; tube of the corolla long, cylindrical, somewhat ventricose above the middle, limb of 5 equal, short, rotund lobes; perfect stamens 2, inserted below the middle of the tube, with 2 aborted stamens between them; anther 2-celled, the cells mucronate in front; style long, with one division small, spurlike; ovary on a thick disk, 2-loculed, with 4 ovules in each cell.—About 11 species in Peru, Colombia, and Brazil.

nóbilis, Hook. Plants stout, erect, smooth, except the infl.: st. 4-angled: lvs. 3–9 in. long, oblong-ovate to oblong-lanceolate, obtusely toothed, narrowed into winged petioles, connate: fls. 2 in. long, yellow, in heads subtended by bright red bracts, the heads forming a panicle. Ecuador. B.M. 5594. F.S. 23:2437. G.W. 10, p. 610. G.Z. 11:16. H.F. II. 9:346. Var. **glaucophýlla,** Lem. (var. *variegàta*, Hort.). Lvs. variegated with pale yellow or white along the veins. F. 1867, p. 154. I.H. 14:528 (as *S. nobilis*); 16:580.—A hothouse plant which is very attractive when well grown, but which becomes straggling and weedy if neglected. Grown mostly for its foliage. **S. parvibracteàta,** Sprague & Hutch. Allied to *S. nobilis*, from which it differs in having wingless petioles, smaller bracts with fewer (3–5) fls. and longer staminodes. Corolla yellow. Trop. Amer.

HEINRICH HASSELBRING.

SANDERSÒNIA (named after John Sanderson). *Liliàceæ*. Herb, suitable for the greenhouse: sts. suberect, simple, leafy: lvs. linear-lanceolate: fls. showy, orange, solitary in the axils, without bracts; perianth persistent, urn-shaped to globose, somewhat inflated; stamens 6; ovary sessile: fr. unknown.—One species, S. Afr. Treatment the same as for gloriosas.

aurantiaca, Hook. Rootstock tuberous: st. simple, 1–2 ft. high, leafy to the apex: lvs. sessile, alternate, linear or lanceolate, 2–4 in. long: perianth bright yellow, ¾–1 in. long. Nov. Natal. B.M. 4716. R.H. 1868, p. 311. J.F. 4:408.

SANGUINÀRIA (Latin, *blood;* referring to the yellowish red juice of the plant). *Papaveràceæ*. BLOODROOT. Low spring-blooming perennial used for borders and for rock-gardens.

3544. Bloodroot.—Sanguinaria canadensis. (×½)

Rootstock several inches long, about ½in. thick, horizontal: lvs. radical, cordate or reniform, usually only 1 from each root-bud, on petioles about 8 in. long: fls. white, often tinged with pink, 1–3 in. across, mostly solitary, on scapes about 8 in. long, appearing just preceding the full-grown lvs.; sepals 2, fugacious; petals 8–12, in 2 or 3 rows, oblong or obovate, early deciduous: caps. 1 in. long, oblong, 2-valved.—A single species common in woods of E. N. Amer., running into several forms (see Fedde in Engler's Pflanzenreich, iv, 104).

The bloodroot is a showy spring flower usually found in woodland, but not a true shade-loving plant, since its growth is made, to a great extent, before the foliage of the trees expands. In cultivation it prefers a rather light soil, but will grow anywhere. It will do as well in sunlight as in shade and will even grow amongst grass, if care be taken not to mow down the leaves until it has perfected the root growth and buds for the following season. The roots are best transplanted after the leaves have ripened, August-dug and -planted roots being best, but they may be moved when the plants are in flower. The roots are offered at such low prices by collectors that the plant should be used to a much greater extent for spring gardening.

canadénsis, Linn. BLOODROOT. RED PUCCOON. Fig. 3544. Described above. April, May. B.M. 162. G.F. 8:215. G.C. III. 51:284. G. 31:447; 34:329. Gn.M. 3:134. Var. **màjor,** Hort., is merely a form with large fls. J.H. III. 52:457. Var. **plèna,** Hort., has more numerous narrower petals. F. W. BARCLAY.

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SANGUISÓRBA (Latin, *blood* and *drink up*, from reputed styptic properties in folk-medicine). *Rosàceæ*. Chiefly perennial herbs, grown as salad plants and also sometimes used in the hardy border.

Leaves unequally pinnate; stipules adherent to the petiole: fls. small, often polygamous or dicœcious, crowded in a dense head or spike at the summit of a long, naked peduncle; calyx-tube persistent, with 4 broad petal-like spreading deciduous lobes; petals none; stamens 4–12: achene (commonly solitary) inclosed in the 4-angled dry and thickish calyx-tube.—About 35 species, natives of the North Temperate Zone. See *Poterium*.

mìnor, Scop. (*Potèrium Sanguisórba*, Linn.). BURNET. Perennial, growing in clumps, glabrous or sparsely hairy: lvs. long, odd-pinnate, narrow, the small lfts. 6–10 pairs and orbicular to oblong and deep-toothed: sts. 1–2½ ft. tall, terminating in small globular or oblong heads: lower fls. in the head staminate, the others perfect, the stigmas purple, tufted and exserted. Eu., Asia, and naturalized in this country.—Sometimes grown in the herb-garden for the fresh young lvs., which are used in salads. It is also an interesting plant for the hardy border. Also recommended as a pasture plant, particularly for sheep. It thrives in dry soils.

canadénsis, Linn. Taller, larger in every way than the above: lfts. oblong to almost triangular-oblong, truncate or cordate at the base, long-stalked, obtuse, sharp-toothed: fl.-heads cylindrical, 2–6 in. long, the fls. all perfect, whitish. Low grounds, Mich., east and south. —An interesting plant, worthy a place in the hardy border, and sometimes sold for that purpose. It produces much foliage. Grows 5–6 ft. tall.

S. atrosanguínea, Hort., is a form listed in the trade as having wiry sts. 3 ft. high bearing heads of rich crimson fls. Possibly the European S. officinalis, Linn.

F. TRACY HUBBARD.†

SANÍCULA (name said to be from *sanare*, to heal; or perhaps from *San Nicolas*). *Umbellíferæ*. SANICLE. BLACK SNAKEROOT. Perennial rather tall glabrous herbs, useful sometimes as a ground-cover.

Leaves few, palmately lobed or parted, those from the base long-petioled: umbels irregular or compound; fls. greenish or yellowish, capitate in the umblets, perfect and with staminate ones intermixed; involucre and involucels few-lvd.: fr. globular, carpels not separating spontaneously, ribless, thickly clothed with hooked prickles.—About 39 species (Wolff, Das Pflanzenreich, hft. 61), temperate regions of the world. The sanicles have no particular horticultural merit, being rather weedy in habit; but they are useful in wild-gardens and for colonizing in woods.

A. *Fls. yellow.*

Ménziesii, Hook. & Arn. St. solitary, 1–2½ ft. high, branching: lvs. round-cordate, 2–3 in. across, very deeply 3–5-lobed: fr. about 1 line long, becoming distinctly pedicellate. Calif. and northward.

AA. *Fls. purple (rarely yellowish).*

bipinnatífida, Douglas. About 1 ft. high, with a pair of opposite lvs. at the base and 1–3 above, long-petioled, triangular to oblong in outline, 2–3 in. long, pinnately 3–5-lobed: fr. sessile. Calif. to Brit. Col.

AAA. *Fls. greenish white.*

marilándica, Linn. St. stout, 1½–4 ft. high: lvs. bluish green, the basal long-petioled, the upper sessile, 5–7-parted: fr. sessile. Atlantic to Brit. Col. Common in woods.

F. TRACY HUBBARD.†

SANSEVIÈRIA (after Raimond de Sangro, Prince of Sanseviero, born at Naples 1710. The spelling Sanseviera is not the earliest). *Liliàceæ*. BOWSTRING HEMP. Herbaceous perennials, essentially tender foliage plants, although beautiful in flower, adapted to the coolhouse. They are grown for the stiff erect lvs., which are usually variegated.

Rhizome short, thick, sometimes stoloniferous: lvs. in a basal rosette, thick cartilaginous, frequently elongated, rather flat or terete: scape simple, tall, stout: fls. greenish white, medium-sized or long, clustered in an often dense raceme; perianth-tube slender, sometimes very long; stamens 6; ovary free, 3-celled.—Trop. and S. Afr. and India; the most recent treatment is by N. E. Brown in Kew Bulletin, 1915, where 54 species are described. The genus is important in yielding fiber.

Sansevierias are easily propagated by division or they may be raised from leaf-cuttings about 3 inches long. These cuttings form roots in sandy soil after about one month, after which a long stolon-like bud is formed, which produces the new plant at some distance from the cutting. Sansevierias are well adapted to house decoration, since they do not require much sunlight. A rather heavy soil suits them best.

A. *Lvs. flat or nearly so.*

thyrsiflòra, Thunb. (*S. guineénsis*, Willd.). Lvs. 2–4 to a growth, from a stout creeping rootstock, erect and smooth, to 1½ ft. long and 3½ in. broad, lanceolate, acute or obtuse, on both sides marked with pale green transverse bands which become obscure with age, tapering into a channelled petiole: fls. greenish white, fragrant. Trop. Afr. B.M. 1179 (properly 1180).

AA. *Lvs. concave.*

zeylánica, Willd. Lvs. 1–3 ft. long, 8–15 in a cluster, sword-shaped, subterete, variegated with transverse markings of a grayish white: scape longer than the lvs.: bracts many: fls. whitish green, 1½ in. long. India. B.R. 160. Var. **Laurénti**, Hort. (*S. Laurénti*, Wildem.) has a band of creamy yellow ¼–½in. or more wide along the lf.-margins in addition to the regular variegation. Trop. Afr. G.W. 13, p. 125. R.B. 30:169.

AAA. *Lvs. cylindrical.*

cylíndrica, Bojer. Lvs. often 3–4 ft. long, 8–10 in a tuft, terete, solid within, dark green, often banded with paler lines, acuminate, occasionally furrowed: scape with infl. shorter than the lvs.: raceme about 1 ft. long; fls. creamy white, tinged with pink. Trop. Afr. B.M. 5093. G.C. III. 16:222. R.H. 1861, p. 448, 450.

The following species have been grown in various botanical gardens but are not known to be in general cult. unless otherwise specified. *S. æthiòpica*, Thunb. Succulent, stemless subshrub: lvs. somewhat rosulate, suberect or erect-spreading, 5–16 in. long, thick, linear-lanceolate, acute, running out into white awl-like tips 2–3 in. long, concave-channeled, back strongly convex, sometimes transversely dark green-banded, margins red or white, somewhat glaucous: infl. 16–30 in. long; fls. white. S. Afr. B.M. 8487.—*S. arboréscens*, Cornu, has sts. reaching a height of 4 ft., furnished entirely with short spreading lvs. E. Trop. Afr.—*S. conspícua*, N. E. Br., is a stemless herb: lvs. 3–5, lanceolate, 9–24 in. long, green on both surfaces, with dark lines above and rusty brown margins: fls. white, E. Trop. Afr.—*S. Córnui*, Gér. & Labr., is stemless, the lvs. not bordered and only a little striped at the base and on the outside. Senegambia; properly S. senegambica, Baker.—*S. Cràsyii*, Hort., is offered in the American trade as a form with variegated lvs.—*S. fasciàta*, Cornu, is stemless: lvs. flat, leathery, 2½ ft. long, 5 in. broad in the middle, bright green, striped and bordered with brown. Congo.—*S. glaùca*, Hort., not Haw., resembles S. zeylanica, but the lvs. are somewhat shorter and not striate. Cochin-China.—*S. grándis*, Hook. f. Stemless: lvs. few, rosulate, obovate-oblong, the largest 3–4 ft. long, 6 in. broad, dull green with broad bands of much darker green: scape 2 ft. high, bearing a densely fld. terminal spike-like panicle 2–3 ft. long: fls. pure white, about 2 in. across. Trop. Afr. B.M. 7877. It produces a very strong, silky fiber.—*S. intermèdia*, N. E. Br., is very similar to S. cylindrica, but the lvs. are channeled, the edges of the channel being acute below and obtusely rounded above. E. Trop. Afr.—*S. libèrica*, Gér. & Labr. Lvs. more than 3 ft. long, bordered with ivory-white, not striped. W. Trop. Afr.—*S. metállica*, Gér. & Labr., is closely allied to what is called S. guineensis having shorter and somewhat broader lvs., which have a metallic tint and fewer markings.—*S. rórida*, N. E. Br. (Sanseverina rorida, Lanza), is almost stemless: lvs. 2-ranked, erect-spreading, horn-shaped, terete beneath, deeply channeled above: scape flexuous, longer than the lvs.: panicle elongated with many short reflexed branches: fls. small. Italian Somaliland.—*S. Stùckyi*, Godefr., is stemless: lvs. quite cylindric except a small furrow on the upper surface. E. Afr.—*S. zanzibárica*, Gér. & Labr., is short-stemmed: lvs. in a distichous rosette, subterete, without furrows, very rigid, up to 5–6 ft. long. Zanzibar.

F. TRACY HUBBARD.

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SÁNTALUM (from the Persian *Chandal* which in turn is derived from the Sanscrit *Chandana*, the name of the tree). *Santalàceæ*. Evergreen glabrous trees or shrubs, and one species, *S. album*, yields the sandalwood: lvs. opposite, rarely alternate, coriaceous: fls. axillary or in terminal trichotomous paniculate cymes, dicœcious; perianth campanulate or ovoid, lobes 4, rarely 5, valvate with a tuft of hair on their face; stamens 5–4, short; disk of scales between the stamens; ovary at first free, finally half-inferior: drupe subglobose.—About 10 species, India, Malaya, Austral, and Pacific Islands. Plants more or less parasitic.

álbum, Linn. SANDALWOOD. A small evergreen glabrous tree: lvs. opposite, 1½–2 in. long, thin, elliptic-ovate or ovate-lanceolate, acute or subacute, narrowed into a slender petiole: panicles terminal and lateral; pedicels about equaling the perianth-tube: fls. at first straw-colored, then blood-red, inodorous even when bruised: drupe globose, size of a cherry, black when ripe. Deccan Penin. B.M. 3235. G.C. III. 49:20.—The wood is white or citron-colored, sweet-scented when dry, and is esteemed in India as a perfume.

SANTOLÌNA (derivation of name doubtful). Often, but incorrectly spelled *Sanctolina*. *Compósitæ*. Shrubs or rarely herbs, natives of Eu. and Asia, mostly in the Medit. region, sometimes grown in the open for ornament.

Leaves alternate, aromatic; margins tuberculously dentate or pinnately lobed, often finely divided: fl.-heads yellow or rarely white, of disk-fls. only, many-fld.; involucre mostly campanulate, squarrose, imbricated, appressed.—About 8 species.

Santolina is valuable for its distinct foliage and is used in the South for specimen planting and in the North for summer bedding and borders. Cuttings for the latter purpose are usually taken in the spring from plants wintered in a frame but may be taken before frost in the fall. They are easily rooted in sand.

Chamæcyparíssus, Linn. (*S. incàna*, Lam.). LAVENDER COTTON. A hardy half-shrubby, much-branched plant, 1½–2 ft. high, with evergreen, silvery gray lvs., having tiny ovate-oblong lfts. and small globular heads of yellow fls., borne in summer: heads solitary, terminal about ¾in. diam.: branches and lvs. canescent. Medit. region. Gn. 78, p. 21. Var. **incàna** differs but little from the type: involucre pubescent.

S. alpina, Linn., is Anthemis montana, Linn., which makes a pretty ground-cover and has yellow fls., but appears not to be in the trade. Gn. 75, p. 595.—*S. viridis*, Willd. An erect shrub: branches leafless: lvs. in 4 vertical ranks, toothed: involucral scales lanceolate. S. Eu. G. 36:25. F. W. BARCLAY.

SANVITÀLIA (after a noble Italian family). *Compósitæ*. Usually low, much-branched herbs grown for their attractive yellow flowers.

Leaves opposite, petioled, mostly entire: heads of fls. small, solitary, with yellow or sometimes white rays; involucre short and broad, of dry or partly herbaceous bracts; receptacle from flat to subulate-conical, at least in fr.; its chaffy bracts concave or partly conduplicate: achenes all or only the outer ones thick-walled, those of the rays usually 3-angled, with the angles produced into rigid, spreading awns or horns, those of the disk often flat and winged.—About 4 species, natives of the S. W. U. S. and Mex. May be grown as an annual in the open, but if given protection it will sometimes flower the second year. Sanvitalias are of easy culture but prefer a light or sandy soil in full sunlight.

procúmbens, Lam. A hardy floriferous annual, growing about 6 in. high, trailing in habit: lvs. ovate, about 1 in. long: fl.-heads with dark purple disk and yellow rays, resembling small rudbeckias, less than 1 in. across, numerous: achenes of the disk flattened and often winged and 1–2 aristellate. Summer to very late autumn. Mex. B.R. 707. R.H. 1860, p. 127. Var. **flòre-plèno,** Hort. A double-fld. variety coming true from seed, and as vigorous as the type. R.H. 1866, p. 70.—Worthy of more extended use as a low border annual. F. W. BARCLAY.

SAP, a term applied to the juices of living plants.

Sap is composed of water containing mineral salts absorbed from the soil, and organic substances chiefly constructed within living cells. The water taken from the soil by the roots or other absorbing organs may contain potassium, sodium, magnesium, calcium, iron, and nitrates, phosphates, sulfates, and chlorids. The different processes and the different reactions that take place in separate tracts of tissue are responsible for the fact that the sap is not alike in composition throughout the body of the plant.

The mineral elements and their salts may be found in nearly all saps. The limits of this note do not permit the enumeration of the large number of organic substances which may be found in the sap of various species. The more important of such compounds may be grouped under the acids, sugars, or carbohydrates and proteins. Many plants are of economic importance because of the materials dissolved in the sap. The sap of the sugar maple, for example, contains over 3½ per cent of sugar, while the sugar-beet and sugar-cane have a sap in which the proportion is very much higher.

The popular expression of "ascent of sap" refers to the fact that water entering the living cells of the roots is forced into the woody tissues or non-living elements through which it passes upward to the leaves at a rate which may vary from a few inches to over a yard an hour. (See *Transpiration*.) The forces operative and the mechanism of the flow are not perfectly understood. Among other facts of interest it may be mentioned that the sap-current may pass through dead sections of stem, although it is equally certain that the activities of the living cells furnish at least a part of the motive power.

The flow of sap from the sugar maple and other trees in the early spring, before the soil has thawed and while it is yet too cold for the living matter of the plant to show any great activity, is not due to the bleeding pressure, but to the expansion of the gases and liquids in the trunk and branches of the tree due to the direct warming action of the sun's rays. During the daytime the bubbles of air in the wood-cells become heated and expand, driving the sap from the wood-cells into the auger-hole which has been bored into the tree. At night the trunk of the tree cools slowly and the flow ceases, to be begun again next day.

The exudation pressure by which water or sap is forced from the living cells is exhibited in the bleeding which ensues when stems and branches are cut away. The pressure which produces bleeding is often called root-pressure, although it is exerted by any part of the plant. Bleeding is exhibited by a large number of trees at the beginning of the growing season, and is also especially noticeable in the vine, dahlia, castor-oil plant, calla, nicotiana, and corn.

The amount of bleeding exhibited by any plant may be found if the stem is cut and bent over in such manner that the end is thrust into a tumbler or small vessel, which will serve to collect the escaping sap.

Interesting records of measurement of the amount of bleeding are available. A specimen of *Betula papyracea* gave off over sixty-three pounds of water in twenty-four hours; an *Agave americana* yielded twelve and one-half pounds in twenty-four hours. The pulque of Mexico is the preparation of sap which collects in the center of the mature rosette of agave when a cavity is cut into it.

The range of concentration of sap as denoted by its osmotic properties varies widely. Cacti and other succulents have a sap which would set up a pressure of only three to twelve atmospheres. Spinose desert shrubs may have a sap which would set up a pressure of over a

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hundred atmospheres. The concentration is greatest in mature leaves, and in the lilac this may be from twelve to twenty-five atmospheres, while the roots of the same plant may not show more than four or six atmospheres.

D. T. MacDougal.

SAPÍNDUS (Latin, *soap* and *Indian*, alluding to use of the fruit as soap in India). *Sapindàceæ*. Soapberry. Trees or shrubs, sometimes somewhat climbing, of economic use and sometimes used as ornamentals.

Leaves alternate, without stipules, abruptly pinnate or simple, 1-lvd. in one species; the lfts entire, rarely serrate: racemes or panicles terminal or axillary: fls. polygamous, regular; sepals 4–5, in 2 rows; petals 4–5, naked or bearing 1 or 2 glabrous or villous scales above the claw; disk annular; stamens 8–10: berry fleshy or leathery; seeds frequently globose, with a bony testa and no aril, black or nearly so.—About 15 species, tropical regions of the world.

The fruit has an alkaline principle known as saponin which makes it useful for cleansing purposes. The fruit was much used in eastern countries before the introduction of soap and is still preferred for washing the hair and cleansing delicate fabrics like silk. The seeds of some species are used for making rosaries, necklaces, and the like.

The soapberry trees in cultivation are evergreen or rarely deciduous trees with pinnate, rather large foliage and with terminal large panicles of small whitish flowers followed by berry-like globose orange-brown to black fruits. With the exception of *S. Drummondii*, which has proved fairly hardy in sheltered positions as far north as Massachusetts, they can be grown in subtropical regions only, but *S. Mukorossi* is apparently somewhat hardier than the rest. They are sometimes planted for ornament in the southern states and in southern California and some, particularly *S. Mukorossi* var. *carinatus*, may possibly be profitably planted for their fruits which are rich in saponin. They do well in rather dry and rocky or sandy soil. Propagation is by seeds which germinate readily and by hardwood cuttings in early spring.

A. *Lfts. obtuse or acutish, 4–9; rachis usually broadly winged: petals without scales.*

Saponària, Linn. A small tree, to 30 ft., with rough grayish bark: lfts. oblong-lanceolate and acute to elliptic-ovate and somewhat obtuse, opposite or alternate, entire, glabrous, veiny and lucid above, tomentulose beneath, 3–4 in. long; rachis usually winged: panicle 7–10 in. long; sepals rounded, petals ovate, hairy: fr. ⅜–¾in. across, globose, keeled, orange-brown, translucent. Fls. in Nov.: fr. in spring. S. Fla., W. India, and S. Amer. Cult. in S. Fla. and S. Calif. S.S. 2:74, 75.

AA. *Lfts. acuminate, 7–19; rachis with narrow margin or marginless: petals with 2 scales.*

B. *Trees evergreen.*

marginàtus, Willd. A tree reaching ultimately 60 ft. in height: lfts. very short-stalked or nearly sessile, 7–13, lance-oblong, acuminate, glabrous above, paler beneath and somewhat pubescent on the midnerve, 2–5 in. long, the upper nearly opposite, the lower alternate; rachis narrowly margined or marginless: fls. white, sometimes tinged with red, in pyramidal panicles; petals ciliate, ovate to ovate-lanceolate; filaments villous: fr. yellow, translucent, globose, keeled, ¾in. across. May, June. S. C. to Fla. S.S. 13:623.—Cult. for ornament in S. Fla.

Mukoróssi, Gaertn. Tree, to 60 ft.: lfts. 8–13, stalked, the stalk ⅛–¼in. long, oblong-ovate to oblong-lanceolate, oblique and cuneate at the base, glabrous, reticulate beneath, 3–6 in. long; rachis with narrow margin: panicles 5–8 in. long; sepals suborbicular to ovate, obtuse, petals ovate to ovate-lanceolate, acute, ciliate; filaments villous: fr. globose, yellow or orange-brown, about ¾in. across, slightly keeled. China, cult. in Japan. S.I.F. 1:71. Var. **carinàtus,** Radlk. (*S. ùtilis*, Trabut). Fr. more fleshy, strongly keeled.—According to Trabut this variety is cult. in Algeria for its fr. which contains nearly 38 per cent of saponin; the trees come into bearing in 8–10 years and a tree may yield 60–120 pounds of berries every year.

BB. *Trees deciduous.*

Drúmmondii, Hook. & Arn. Wild China Tree. Soapberry. Tree, to 50 ft., with scaly red-brown bark: branchlets pubescent while young: lfts. 8–19, short-stalked, lanceolate, broadly cuneate and oblique at the base, glabrous above, pubescent beneath, 2–3 in. long; rachis marginless: panicles pubescent, 6–9 in. long; sepals acute, ciliate; petals much longer, ovate, pubescent inside; filaments villous: fr. subglobose, not keeled, ½in. across, yellow, finally black. May, June; fr. Sept., Oct. Ark., La. to Ariz. and N. Mex. S.S. 2:76, 77 (as *S. marginatus*). B.B.(ed. 2) 2:500.

Alfred Rehder.

SÀPIUM (the Latin name used by Pliny for a resiniferous pine). *Euphorbiàceæ*. Tropical trees and shrubs cultivated for their economic products and sometimes for ornament.

Glabrous: juice milky and poisonous: lvs. alternate or rarely opposite, simple, denticulate to entire; stipules small, 2 conspicuous glands at the apex of the petiole and on each of the scale-like bracts: fls. generally in terminal spikes, the pistillate singly below, the staminate in 3's above, all apetalous; calyx of staminate fls. 2–3-lobed, the lobes imbricate; stamens 2–3, filaments free; ovary 1–3-celled, 1 ovule in each cell; a 3-parted central column remaining after dehiscence of the caps.: seed without a caruncle.—Nearly 100 species, in the tropics of both hemispheres, but chiefly in Amer. Two intro. species are now found wild in S. Fla. Related to Stillingia, Hura, and Homalanthus.

In their native country a number of species of Sapium are utilized in many ways. They are chiefly important as a source of rubber. *S. Jenmanii* is the chief source of rubber in British Guiana, where it is found in the alluvial forests in humid situations. It does best in well-drained clayey peat. *S. verum*, once common in Colombia, has been cut for the rubber until it is now rare, but does well under cultivation in higher altitudes, yielding ten to eighteen pounds of raw rubber to each tree. A number of other species are used for rubber in South America. *S. Pavonianum* yields a medium grade. It is easily grown but is scarcely in cultivation. *S. sebiferum* is cultivated, especially in China, for the wax of the seed-covering which is used for candles, soap, and cloth-dressing. The wood of this and other species is utilized. Some of the "jumping beans" are seeds of sapium which contain insect larvæ. Sapium may be propagated by seeds or by cuttings. The best varieties are sometimes top-grafted on seedling stocks.

Pavoniànum, Huber (*S. ùtile*, Preuss. *S. biglandulòsum*, Muell. Arg. in part). Palo de Leche. Tree, 30–50 ft. high: lvs. oblong, lanceolate, or oblanceolate: spikes solitary, elongate: style cylindrical, not persistent on the caps.: the seeds with red, aril-like covering, soon separating from the central column. Colombia.

vèrum, Hemsl. Virgin Rubber. Cancho Blanco. Tree, 60–75 ft. high: lvs. oblong-lanceolate to elliptical, acute at the base, apex rounded: style persistent on the caps.: otherwise similar to the foregoing species. Colombia and Ecuador.

Jénmanii, Hemsl. A large tree: lvs. oblong-lanceolate, abruptly and obtusely acuminate; glands of the petiole short, sessile; lateral lf.-veins more curved than in the preceding species and the ovary 1-celled: style not persistent. British Guiana.

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sebiferum, Roxbg. (*Cròton sebíferus*, Linn. *Excæcària sebífera*, Muell. Arg. *Stillingia sebífera*, Michx.). CHINESE TALLOW TREE. VEGETABLE TALLOW. Tree, 25–30 ft. high: lvs. broad rhombic-ovate, 1–3 in. broad, beautifully red-colored in age: racemes terminal: caps. ½in. thick; seeds long adhering to the central column, the aril-like coating white. China, and now cult. and naturalized in many tropical lands.

Among the species noted for their very poisonous juice are: *S. indicum*, Wild., with white bark and oblong willow-like lvs., in India, and *S. Hippòmane*, Mey., MILK TREE, POISON TREE, with thick elliptical lvs. with the apex cucullate inflexed. W. Indies to Brazil.

J. B. S. NORTON.

SAPODILLA is the name applied in the United States to *Achras Sapota*, Linn., of the family *Sapotaceæ*, generally considered one of the best indigenous fruits of the American tropics. The tree is commonly cultivated, as well as naturalized, on the Florida Keys, and the fruit (Fig. 3545) is offered in south Florida markets.

Botanically the sapodilla is closely related to the mamey sapote (*Lucuma mammosa*), the ti-es (*L. nervosa*) and the star-apple (*Chrysophyllum Cainito*), fruits which are well known in various parts of tropical America. The tree is evergreen, stately, with a dense rounded or conical crown sometimes attaining a height of 50 to 60 feet, horizontal or drooping branches, and stiff, glossy leaves thickly clustered at the ends of the young branchlets. The wood is hard and very durable, timbers in an excellent state of preservation having been found in the Mayan ruins of Yucatan. The bark contains a milky latex known commercially as chicle,

3545. Sapodilla, the fruit of Achras Sapota. (× about ½)

which is secured by tapping the trunk, and is exported in considerable quantities from Mexico to the United States, where it forms the basis of chewing-gum. The leaves are borne upon slender petioles up to 1 inch long, the blades entire or emarginate, ovate-elliptic to elliptic-lanceolate in outline, rounded-cuneate at the base and commonly obtuse at the apex, 2 to 5 inches long, glabrous, of rich green color, the midrib prominent below. The small inconspicuous flowers are produced upon short finely pubescent pedicels in the leaf-axils toward the ends of the branchlets; the calyx is composed of six small ovate-acuminate hairy sepals, the corolla white, tubular or urceolate, lobulate at the top, the stamens six, opposite the lobules, with short flattened attenuate filaments and lanceolate-acuminate extrorse anthers; staminodes six, petaloid; style clavate, hairy at the tip, the ovary ten- to twelve-celled, each cell containing one ovule.

The fruit is very variable in form, commonly round, oval, globose-depressed, or conical, and 2 to 3½ inches in diameter. The skin is thin, rusty brown, somewhat scurfy, giving the fruit a striking resemblance to an Irish potato. The flesh is yellowish brown, translucent, soft and melting when fully ripe, sweet and delicious, but when green containing tannin and a milky latex, so that it must not be eaten until it has become quite mellow. The seeds vary from none to ten or twelve, and are hard, black and shining, obovate, flattened, about ¾ inch long, easily separated from the pulp.

The flavor of the sapodilla is difficult of description, likened to that of a pear by some writers, and with a peculiar character common to several sapotaceous fruits. Some of the early writers were enthusiastic in praising it, the Spanish historian, Oviedo, going so far as to call the sapodilla the best of all fruits. More recently Firminger, an Anglo-Indian horticulturist, wrote that "a more luscious, cool and agreeable fruit is not to be met with in this or perhaps any country in the world," while Descourtilz says it is "melting, and has the sweet perfumes of honey, jasmin, and lily-of-the valley." In Florida it is a general favorite, especially among residents of the keys, and in numerous other parts of tropical America it assumes considerable importance among cultivated fruits.

The tree is considered by Pittier to be indigenous in Mexico south of the Isthmus of Tehuantepec, in Guatemala, and possibly in Salvador and northern Honduras, being especially abundant in the lowlands of Tabasco, Chiapas, and the western part of Yucatan, which are the principal centers of production of chicle gum. The common name is derived from the Nahuatl word zapotl or tzicozapotl, the latter meaning "gum zapotl" and surviving to the present day in the precise form chicozapote, by which the tree is commonly known in southern Mexico; zapotl was the name given by the Aztecs to all soft sweet fruits. In Spanish-speaking countries the sapodilla is frequently called níspero, which name properly belongs to the European medlar. In the British West Indies the name naseberry is common. In Brazil one form of the fruit is called sapotí, another sapota. The German name for the tree is Breiapfelbaum, the French sapotillier, and the Dutch mispelboom.

From its home in tropical America, the sapodilla has been carried around the globe, and though less commonly cultivated in the Orient than the papaya, it is grown in many regions, particularly in some parts of southern India, where, according to Macmillan, it thrives up to elevations of 3,000 feet, though in Ceylon it is seldom productive above 1,500 feet and succeeds best on the coast. In Ecuador its cultivation is said by Pittier to extend into the temperate belt at altitudes of more than 8,000 feet. Its culture in Florida is limited to the southern part of the state, approximately the section south of Palm Beach on the east coast and the Manatee River on the west. Mature trees have passed uninjured through temperatures of 28° F., according to Reasoner. A notable advantage of the tree for some parts of the West Indies is the fact that the branches are tough and not easily broken by hurricanes. In California it has not yet fruited, though in favored locations specimens have occasionally attained an age of several years without being injured by frost. Even in the tropics, however, the tree grows very slowly, and in California the cool winters greatly hinder its development. It seems probable that it may yet be fruited in protected foothill regions, but its culture in most parts of southern California is not practicable.

The soil best adapted to the sapodilla seems to be rich sandy loam, but it thrives almost equally well on light clay and on the shallow sandy soil, underlaid with soft limestone, which is found on the lower east coast of Florida. Even though grown under the most favorable conditions, the trees rarely come into bearing until six to eight years of age, if seedlings, and in some sections do not attain a greater ultimate height than 20 to 30 feet. They should not be set closer together than 25 to 30 feet, and require very little pruning, because of their close compact growth. As a general

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thing the trees bear heavily, and two crops a year are frequently produced; this, with the natural variation in season among seedling trees, results in ripe fruit being found in the markets of tropical America at nearly all times of the year.

Experiments have shown that the sapodilla can be shipped very successfully and without excessive care in packing; notwithstanding the delicate texture of the skin it keeps well, and if picked while still hard can be kept in good condition for ten days or more. Shipments have been made from the Florida Keys to New York, the fruit being placed in small baskets which hold half a dozen good-sized fruits, six of these baskets being packed in a tomato-crate. For local consumption or for shipping to short distances, the common procedure in Florida is to pull the fruits from the tree and throw them into boxes or baskets, in which they are carried to market, where the ripe ones are picked out and sold from day to day. The sapodilla is used almost exclusively as a fresh fruit, usually eaten out of hand, but is sometimes utilized in Brazil and Cuba to prepare a delicious sherbet. Little is known of its culinary possibilities. Due to its lack of acidity it is doubtful whether it will lend itself to many different uses.

The sapodilla is generally propagated by seed, but the variation among seedlings in productiveness as well as in quality, size, and shape of fruit necessitates some asexual means of propagation, if the most desirable seedling forms are to be perpetuated. Horticulturists have been as dilatory in applying vegetative propagation to the sapodilla as they have with most of the other tropical fruits, but experiments in Florida have shown that it can readily be budded, using as stocks seedlings of the same species.

Seeds, if kept dry, will retain their vitality for several years, and are easily transported through the mails to any distance. They should be planted in shallow flats of light sandy soil, covering them to the depth of ½ inch. In warm weather germination takes place within a month, and the young seedlings, after they have made their second leaves, can be potted off and carried along in pots for the first year or two, when they are ready to be set out in the open ground. If to be budded, they may be planted in nursery rows about 3 feet apart, 18 inches apart in the row. In south Florida, May has proved to be a favorable season for budding; in strictly tropical regions the work can probably be done at any time, provided the stock plants are in active growth. Budwood should be chosen from young branches which have begun to lose their greenish color and assume a brownish tinge, and should be carefully examined to see that the eyes are well developed. Shield-budding is the method used, the details being practically the same as with the mango; buds should be cut slightly more than an inch in length, and the wood removed if it comes out readily. After making the incision in the stock, the bud should be inserted and tied as promptly as possible, as the latex soon collects around the incision and renders it difficult to do the work properly. Waxed tape should be used for wrapping. After three or four weeks the stock may be headed back, and the wrap loosened, leaving the eye exposed so that it may start into growth.

Occasional seedlings produce fruits which are nearly or quite seedless; some produce fruits weighing more than a pound, while others do not weigh over two or three ounces; some are unusually prolific, or ripen their fruit at especially desirable times of the year. From such seedlings one should select the best for propagation, having in mind the characteristics which it is most desired to perpetuate.

The tree seems to be remarkably free from insect pests and fungous diseases, and in Florida requires very little attention. While fertilizers are not commonly employed, their judicious use will doubtless improve the size of the fruit and have a beneficial effect in those frequent instances where the tree brings to maturity so many fruits that some remain very small.

F. W. Popenoe.

SAPONÀRIA (Latin, *soap*, the mucilaginous juice forming a lather with water). *Caryophyllàceæ*. Soapwort. Hardy often coarse annual or perennial erect or decumbent herbs, used for borders and rockeries.

Habit either annual and resembling that of gypsophila or perennial and similar to that of silene: lvs. flat: fls. in dichotomous cymes; calyx ovoid or oblong-tubular, 5-toothed, nerves obscure; petals 5, narrow-clawed, blade entire or emarginate, the base with scales or naked; stamens 10; ovary 1-celled: caps. ovoid or oblong, very rarely subglobose.—About 40 species, Eu., principally the Medit. region and extra-Trop. Asia. Saponarias are readily established in any soil and require but little care. *S. ocymoides* is an attractive plant for the rockery or for edging. Prop. by seed or division.

A. *Plants annual.*

B. *Calyx 5-angled.*

Vaccària, Linn. (*Lýchnis Vaccària*, Scop. *Vaccària vulgàris*, Hort.). Cow-herb. Annual: lvs. ovate-lanceolate, sessile: fls. paniculate, red; calyx pyramidal, 5-angled, glabrous; bracts membranaceous, acute. July, Aug. Eu. B.M. 2290. Var. **álba,** Hort., is a white-fld. form.

BB. *Calyx not 5-angled.*

calábrica, Guss. (*S. multiflòra*, Hort.). Annual, divaricate-branched, pilose-viscous above: lvs. opposite, oblong-lanceolate, obtuse, attenuate to the petiole, glabrous, ciliate at base: fls. in a dichotomous corymbose panicle, solitary in the axils, pale rose; calyx cylindrical, segms. obtuse; petals entire, top orbiculate, throat naked. Spring, Italy and Greece. Gn. 71, p. 78. Gt. 1:100. R.H. 1851:281. Var. **álba,** Hort. (*S. multiflòra álba*, Hort.), is a form with white fls. There are horticultural forms of this species offered in the trade under the names of *S. multiflòra compácta* and *S. multiflòra compácta álba*.—Seed should be sown in autumn for spring bloom or in April for summer-flowering.

3546. Saponaria officinalis. (×⅓)

AA. *Plants perennial.*

B. *Fls. yellow.*

C. *Lvs. linear: stamens violet.*

lûtea, Linn. Cespitose: sts. 3–6 in. high, 2-lvd.: lvs. subradical, linear, ciliate at base: fls. yellow, in dense heads; calyx round, hairy; petals linear, crenate; stamens violet. Eu.

CC. *Lvs. spatulate-oblong: stamens yellow.*

bellidifòlia, Smith. Cespitose, glabrous: sts. 8–16 in. high: lvs. spatulate-oblong, attenuate to the petiole; cauline lvs. few, linear-spatulate: fls. yellow, sessile, congested in a small head at the top of the st.; calyx subcylindrical, teeth triangular; petals oblong-linear; stamens yellow: caps. oblong. S. Eu. to Greece.

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BB. *Fls. rose or white.*

C. *The plants not cespitose.*

D. *St. stout, erect.*

officinàlis, Linn. BOUNCING BET. Fig. 3546. Perennial: sts. 1½–2½ ft. high, leafy, simple, clustered, glabrous: lvs. mostly oblong-lanceolate, 3-nerved: fls. light pink (nearly white in shady situations), in compact, corymbose, paniculate cymes; calyx glabrous, the teeth triangularly acuminate; petal-lobes obovate, entire, notched at apex. July, Aug. Eu. Var. **álbo-plèna,** Hort., is a double white-fld. form growing 2 ft. high. June–Sept. Var. **caucásica,** Hort. (*S. caucásica,* Hort.), is a double-fld. form, the fls. described as white tinted rose by some, as deeper colored than the type by others, grows 15 in. high. All summer and fall. Var. **caucásica flòre-plèno,** Hort. (*S. caucásica flòre-plèno,* Hort.), is said to have double reddish purple fls. July–Sept. Var. **flòre-plèno,** Hort., is quite double-fld., the fls. paler than the type. Var. **plèna,** Hort., grows 1–3 ft. high and lilac, rose, or white fls. July–Oct. Probably includes some of the other double varieties. Var. **ròseo-plèna,** Hort., grows 2½–3 ft. high and rose-colored fls. July–Sept.

DD. *St. slender, decumbent.*

ocymoìdes, Linn. Sts. much-branched, 6–9 in. high, half-trailing: lvs. ovate-lanceolate, about 1-nerved, small, acute: fls. bright pink, in loose, broad cymes. Summer. Eu. B.M. 154. Gn. 60, p. 245; 78, pp. 319, 593. G 35:841. G.M. 56:433; 57:651. G.W. 8, p. 1; 15, pp. 8, 647. Var. **álba,** Hort., is a form with pure white fls., in reality a hybrid between two forms of the species. Var. **floribúnda,** Hort., is a form more profusely fld. than the type, with lvs. small and lanceolate and fls. soft pink. Gn.W. 25:67. Var. **splèndens,** Hort., has large fls. which are a more intense rose than the type. Var. **splendidíssima,** Hort., has large deep rosy crimson fls. Var. **versícolor,** Hort., is a form in which the fls. are at first pure white later becoming rose. A cross between a white-flowering variety and var. *splendens.* R.H. 1913, p. 303.

CC. *The plants cespitose.*

D. *Lvs. obovate-elliptic.*

deprèssa, Biv. Cespitose: radical lvs. tufted, obovate-elliptic, depressed: fls. subumbellate, large, rose, pedunculate; calyx very long, 5-angled, viscous-pubescent; petals bifid. Sicily.

DD. *Lvs. linear.*

cæspitòsa, DC. Cespitose: sts. 2–3 in. high, nearly naked, fl.-bearing at the top: lvs. linear, glabrous, mostly radical, hardly denticulate: fls. rather umbellate, rose; calyx cylindrical, villous, deeply lobed, lobes acute; petals emarginate at the top, the blade very narrow. Pyrenees. G.C. II. 15:501.

S. japónica, Hort. John Saul, is botanically unknown.—*S. pulvinàris,* Boiss. (S. libanotica, Hort., S. Pumilio, Boiss.). Densely cespitose-pulvinate: sts. low, 3–7-fld.: lvs. small, linear, subcarinate: infl. hirsute-villous; fls. bright rose.—*S. Sùndermannii,* Hort., closely resembles S. bellidifolia, but has rather larger fls. and more of them. June.—*S. Weinmannii,* Hort., is closely allied to S. cæspitosa, possibly only a form of it, but has paler purple fls. and a shorter calyx. Its habit is very compact and it is only 2–3 in. high.

F. TRACY HUBBARD.†

3547. White sapote.—*Casimiroa edulis.* (×⅓)

SAPOTE, WHITE. A tropical fruit (Fig. 3547). The zapote blanco of the Mexicans (*Casimiroa edulis*), known in California and Florida as white sapote, is a fruit little cultivated outside of Mexico, but occasionally seen in the southernmost parts of the United States, in the West Indies, and even in the Orient, where it is probably of recent introduction. Horticulturally, it has been given more attention in southern California than in any other region. (P. 680.)

The tree reaches an ultimate height of 50 feet or more, with a short stout trunk, often covered with warty excrescences around the base, and a broad erect crown, sometimes spreading and dome-shaped, under favorable conditions densely foliaged and of very attractive and ornamental appearance. The bark is somewhat rough, ashen gray when mature, and dotted with numerous warty light gray lenticels. The leaves are alternate, digitate, borne upon long slender petioles and composed of three to seven, commonly five, elliptical to lanceolate, acuminate leaflets, coppery when young but eventually of glossy bright green color. The small greenish flowers, less than ½ inch in diameter, are produced in spring on short axillary panicles, and are composed of a four- or five-parted calyx, with short

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acute pubescent segments, and a four- or five-petaled greenish corolla, valvate in the bud, with small oblong-elliptic acute concave petals; the stamens are as numerous as the petals and alternating with them, with short filaments and small oblong anthers; the ovary is superior, five-celled, globose, bearing at its apex a three- to five-lobed sessile stigma.

The fruit, when of a choice variety, is as large as a good-sized orange, and somewhat resembles a quince in general appearance. The tender yellow or yellowish green skin, scarcely as thick as that of an apple, surrounds the soft cream-colored pulp, of melting and delicate texture and pleasant but peculiar flavor, sweet and lacking any trace of acidity, with sometimes a touch of bitterness. The seeds, normally five in number, an inch long and half as wide, are oblong to elliptical in form, light yellow in color, reticulated on the surface; their number is frequently decreased by abortion to two or three. In the tropics the fruit ripens in July and August, in California usually not before October; it is picked when fully mature but while still hard, and must be laid away for a few days before it is mellow and ready for eating. Because of its thin skin and the delicate texture of the flesh it does not ship so readily as some other fruits, yet if taken while still hard, and carefully packed, it can be sent considerable distances. It is commonly used while fresh, and an over-indulgence in it is thought by the Mexicans to induce sleep, but it is doubtful whether there are grounds for this belief. The white sapote is popular among the Mexicans, especially in the region around Guadalajara, and is regularly found in the markets.

The hardiness of the tree is attested by its behavior in southern Europe; it has fruited at La Mortola, and is cultivated at other points on the Riviera; it is also said to have fruited in the island of Jersey. In Mexico it flourishes up to altitudes of 7,000 feet, according to Von Mueller.

Although introduced to California from Mexico about 1810, it has not yet become extensively cultivated in that state, and large specimens are rather rare. One of the oldest trees, thought to have been planted about a century ago, is growing on De la Guerra Street in Santa Barbara. Although uncared for amidst the most unfavorable surroundings it bears regularly; its fruits, however, are small and practically worthless. A number of trees of considerably lesser age—most of them planted about 1895—are in bearing in various parts of southern California, and while some produce small, inferior fruits others produce large ones of delicious flavor. After it comes into bearing the tree commonly produces regularly and abundantly. It has shown itself to be remarkably drought-resistant, though it naturally succeeds much better when irrigated in the dry season. It seems to prefer a well-drained sandy loam, but thrives on heavy clay if the drainage is good, and in south Florida has done well on shallow sandy soil underlaid with soft limestone. In this latter state it has not been cultivated many years, but has come into bearing in the vicinity of Miami and seems to be at home. It has also fruited in Cuba.

Seeds should be planted as soon as possible after their removal from the fruit, in flats of light, porous soil, or singly in 3- or 4-inch pots, covering them to the depth of 1 inch. If the weather is warm, or artificial heat is provided, germination will take place within three or four weeks. The young plants should be grown in pots until 2 to 3 feet high, when they may be set out in the open ground. While young, the white sapote should be watered liberally to encourage growth, though it can get along with little water if necessary. The terminal bud should be pinched out to force the tree to branch when about 3 feet high; otherwise it is likely to make a growth of 10 to 12 feet before branching, being liable to be broken off by a severe wind.

Seedlings do not come into bearing until seven or eight years old, and are undependable at best, many producing fruit of inferior quality. For this reason trees propagated by some vegetative means should be planted. Shield-budding is successfully practised, the method being essentially the same as with the avocado. Stock plants should be selected from young, vigorously growing seedlings, with stems about ⅜ inch in diameter at the base. Budwood is taken from the ends of the branches, using fairly well-matured wood which has assumed the ashen-gray color. The buds are cut about 1½ inches long, leaving any wood that may adhere to them, and are inserted in T-incisions, after which they are bound firmly in place with waxed tape. At the end of two to four weeks, depending upon the climate, they may be unwrapped, and then re-wrapped loosely, leaving the bud exposed so that it may start into growth, at the same time lopping back the stock to a point 3 or 4 inches above the bud. In the tropics budding can probably be done at almost any season; in California spring and summer, when the stock plants are in most active growth, are the best times.

Three named varieties have been established in California—Harvey, Parroquia, and Gillespie. Of these Harvey is the largest and probably the best; the tree is very prolific, and individual fruits sometimes measure 3½ inches in diameter. F. W. POPENOE.

SAPROPHYTE (Greek, *rotten*, and *plant*, i.e., living on dead organic matter). A dependent, or heterotrophic, plant (whether bacterium, fungus, or higher plant) subsisting upon the humus of the soil, or dead or decaying organic materials. A holosaprophyte is a plant which lives exclusively on dead organic food. One which is only partially dependent on dead organic food and also feeds independently, as an autophyte, is appropriately called a partial saprophyte. The customary classification which includes under the term "saprophyte" all bacteria that do not subsist on living plants or animals no longer corresponds with facts. The integrity of the classification has been destroyed by the discovery of certain bacteria in the soil, as the nitrifying bacteria, which are able, even without sunlight, to appropriate the carbon dioxid of the atmosphere. Saprophytes intergrade with parasites on the one hand so closely and with autophytes on the other that the distinction of them is often difficult. For example, it is supposed that the chestnut blight (*Endothia parasitica*) was originally saprophytic, but has recently assumed a virulent parasitic development. Among the fungi we class as saprophytes all plants which live upon a dead or decaying organic substratum. Such are the baker's yeast (*Saccharomyces cerevisiæ*), the mushroom (*Agaricus campestris*), and the stinkhorn (*Phallus impudicus*). Most mushrooms and toadstools are saprophytes. Some of the flowering plants possessing ectotrophic mycorrhiza (Indian pipe, *Monotropa uniflora*) and endotrophic mycorrhiza (*Neottia Nidus-avis*, *Corallorhiza innata*, *Epipogum aphyllum*, snow-plant, *Sarcodes sanguinea* and *Thismia Aseroë*) are also classed as saprophytes. A few algæ are saprophytic. A cave-growing form of *Glœothece rupestris*, known as var. *cavernarum*, utilizes organic food and is colorless.

JOHN W. HARSHBERGER.

SARÀCA (from *Sarac*, the name of the genus in India). *Leguminòsæ*. Unarmed trees (or tall climbing shrubs?), grown in the warmhouse.

Leaves abruptly pinnate, the lfts. leathery, often few-paired; stipules small, caducous: fls. yellow, rose, or scarlet, racemose, the racemes in short very branched panicles which are often lateral; calyx-tube elongated, segms. 4, petal-like, ovate, strongly imbricated; petals none; stamens 3–9, free; ovary stipitate, ovules many: legume oblong or elongated, flat-compressed or turgid, leathery to somewhat woody, 2-valved.—About 6 species, Trop. Asia.

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indica, Linn. A medium-sized tree: lfts. 6–12, oblong or oblong-lanceolate, acute or obtuse, 3–9 in. long, entire, short-petioled: fls. orange-red, fragrant, collected in compact, roundish panicles which are shorter than the lvs.; stamens usually 6 or 7, inserted on the fleshy annular ring at the summit of the calyx-tube; style long, curved: bracts red, appearing as a calyx: pod 4–10 in. long, 4–8-seeded; seeds oblong, compressed, 1½ in. long. India and Malaya. B.M. 3018 (as *Jonesia Asoca*). —It has flowered well with greenhouse treatment at height of 4 ft. It is suitable for outdoor planting only in tropical regions. Intro. into S. Fla.

caulifìora, Baker. A shrubby tree: lfts. 10–12, rigidly subcoriaceous, the upper oblanceolate-oblong, acute, 1 ft. or more long, the lower shorter, more oblong: corymbs solitary or in pairs, nearly sessile, dense, 4–6 in. broad: fls. scarlet; stamens 7. India.—Intro. into S. Fla.

F. Tracy Hubbard.†

SARCÁNTHUS (name from Greek words signifying *flesh* and *flower*, in allusion to the fleshy nature of the blossom). *Orchidàceæ*. A small genus related to Vanda, and owing to the smallness of the fls. seldom cult.: sepals and petals similar; labellum firmly united with the base of the column, spurred, with 2 small lateal lobes and a longer concave middle lobe: foliage and habit of vanda. Give plenty of water in the growing season. They should have basket cult., with fern-root, and a temperature of 65° to 85°. When at rest, give very little water and reduce the temperature to 55°. Cult. practically as for vanda.

teretifòlius, Lindl. (*Luìsia tères*, Lindl.). St. 1 ft. high, with cylindrical lvs. 2–4 in. long: raceme bearing 7–8 inconspicuous fls.; sepals and petals oblong, dull green, with red disk; labellum slipper-shaped, white, lateral lobes edged with red. Sept. China. B.M. 3571.

S. inflàtus, Rolfe. Distinguished by its inflated spur, which is much longer than the segms. of the lip: sepals and petals green, with 2 dark brown stripes; front lobe of lip light yellow, side lobes white. Annam.—*S. robùstus*, O'Brien. Lvs. narrowly oblong, about 6 in. long: spike few-fld.; fls. cream- to blush-white, marked with claret-purple. Borneo. G.C. III. 55:21.

Heinrich Hasselbring.

SARCOCÉPHALUS (Greek, *flesh* and *head*, alluding to the fleshy heads of fruit). *Rubiàceæ*. Shrubs or trees sometimes climbing, suitable for warmhouse culture or hardy in the extreme southern United States.

Branches subterete or obtusely quadrangular: lvs. opposite, rarely in whorls of 3, subcoriaceous: heads terminal and axillary; fls. whitish, pale pink or yellowish and crowded; calyx-tubes cohering, teeth 5–6, hairy; corolla narrowly funnelform, rather fleshy, 5-lobed; anthers 5, subsessile; disk inconspicuous; ovary 2-celled; syncarpium fleshy.—About 30 species. *S. esculéntus*, Afzel. A tree with long branches or often a scandent shrub 10–25 ft. or more high: lvs. elliptical, short-acuminate: fls. in terminal heads, white, pale pink or yellowish, fragrant; calyx-teeth furnished with alternating filiform-clavate appendages: fruiting head 2½–3½ in. diam., deep red with brown granulated surface. Trop. Afr.—Edible, the peach or country fig of the natives of Sierra Leone. *S. ovàtus*, Elmer. Tree, 18 ft. high, with rigid branchlets: lvs. glabrous, leathery, ovate or elliptic, acute at the base, obtuse at the apex, 7 x 3½ in.: infl. capitate, peduncled; fls. reddish; calyx with clavate, pubescent and deciduous appendages; corolla glabrous, nearly ½in. long. Philippines. Said to be intro. into Calif.

SARCOCHÌLUS: *Thrixspermum*.

SARCOCÓCCA (Greek, *flesh* and *berry*, alluding to the fleshy fruit). *Buxàceæ*. Ornamental woody plants grown chiefly for the handsome lustrous foliage.

Evergreen glabrous shrubs: lvs. petioled, alternate, coriaceous, entire, without stipules: fls. unisexual, apetalous, in short axillary racemes with the pistillate fls. at the base; sepals 4 or 6; disk wanting; staminate fls. with 4–6 stamens opposite the sepals; pistillate fls. with a 2–3-celled ovary with 2–3 short erect or recurved styles: fr. indehiscent, globose to ellipsoid, coriaceous or fleshy, 1–2-seeded.—Five species distributed from Cent. and W. China to the Malay Archipelago.

They are handsome evergreen shrubs with ovate to lanceolate entire lustrous leaves, rather insignificant whitish flowers in axillary clusters and red or purple berry-like fruits. *S. ruscifolia* and *S. Hookeriana* var. *humilis* have proved hardy in sheltered positions at the Arnold Arboretum, while *S. saligna* is tender. They do not seem particular as to the soil and do best in partly shaded situations. Propagation is by seeds or by cuttings which root easily.

A. *Lvs. distinctly 3-nerved, caudate-acuminate.*

salìgna, Muell. Arg. (*S. prunifórmis*, Lindl. *Pachysándra coriàcea*, Hook.). Shrub: lvs. oblong-ovate to oblong-lanceolate, caudate at the apex, broadly cuneate at the base, 2–5 in. long; petiole ½–¾in. long: racemes about ½in. long: fr. purple, ovoid, ⅛–½in. long. Himalayas. B.R. 1012. I.T. 3:90.

3548. Snow-plant.—Sarcodes sanguinea. (× about 1)

AA. *Lvs. obscurely veined.*

Hookeriàna, Baill. (*S. prunifórmis* var. *Hookeriàna*, Hook.). Shrub: lvs. oblong-lanceolate to narrow-lanceolate, acuminate, cuneate at the base, 2–3½ in. long; petiole ¼–½in. long: styles 3: fr. subglobose, black. Himalayas, Afghanistan. Gn. 25, p. 359. Var. **dìgyna,** Franch. Styles 2. W. China. Var. **hùmilis,** Rehd. & Wilson. Shrub, 1–5 ft.: lvs. lanceolate to oblong-lanceolate, 1¼–2 in. long. W. China.—Only the varieties seem to be in cult.

ruscifòlia, Stapf. Shrub, to 6 ft.: lvs. ovate to elliptic-ovate, acuminate, rounded or broadly cuneate at the base, dark green and lustrous above, 1¼–2 in. long; petioles ⅛–½in. long: fls. in few, usually 4-fld. racemes: fr. subglobose, dark scarlet. Oct.–Feb. Cent. and W. China. Var. **chinénsis,** Rehd. & Wilson (*S. saligna* var. *chinénsis*, Franch.). Lvs. elliptic-ovate to elliptic-lanceolate, cuneate or broadly cuneate at the base, 1½–2½ in. long. W. China.

Alfred Rehder.

SARCÒDES (Greek, *flesh-like*). *Monotropàceæ*. *S. sanguìnea*, Torr. (Fig. 3548), is the Snow-Plant of the Sierra Nevadas. It is a low and fleshy plant growing 3–12 in. high and entirely devoid of green lvs. It belongs to that strange family which comprises the fleshy and parasitic plants, of which the Indian-pipe or corpse-plant is an example. Few species are known in this family, and they are all local or rare. The snow-plant derives its popular name from its habit of shooting up and blossoming as soon as the snow melts away in the

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spring. The specific name *sanguinea* refers to the blood-red color of the entire plant. The snow-plant grows at an altitude of 4,000–9,000 ft. It is the only species of the genus, and is not known to be in cult.

SARCOPÒDIUM (Greek for *flesh* and *foot*). *Orchidàceæ*. Warmhouse orchids, by some referred to Bulbophyllum and Dendrobium.

Rhizome creeping, the 2-lvd. pseudobulbs usually distant on it: infl. terminal, the fls. single or in racemes; sepals and petals similar, the former usually forming a manifest chin; lip much smaller. Related to Dendrobium, and much like it in fl.-structure.—Species about 20, in the Malay Penins. and adjacent islands, and in the Trop. Himalayas.

ámplum, Lindl. (*Dendròbium ámplum*, Lindl. *Bulbophýllum ámplum*, Reichb. f.). Habit much like a bulbophyllum: pseudobulbs oblong, ovate, or fusiform, up to 2 in. long: lvs. oblong, acute, 4–6 in. long, 2 in. broad: fls. greenish white, suffused purplish; raceme few-fld., dorsal sepal lanceolate, the lateral triangular; petals linear-lanceolate, long-acuminate; lip with round lateral lobes erect, the middle lobe rhomboid, acute. Trop. Himalayas. P.M. 7:121.

S. acuminàtum, Kränzl. (Dendrobium acuminatum, Rolfe). Raceme few- to many-fld., lax; sepals triangular, long-acuminate, about 1½ in. long; petals of same length but narrower, yellowish white; lip with lateral lobes obovate, rounded, retuse, the midlobe ovate-triangular, acute, the apex reflexed. G.C. III. 42:210; 46:150. G.M. 52:659. J.H. III. 59:291.—*S. Cœlógyne*, Kränzl. (Dendrobium Cœlogyne, Reichb. f.). Fls. usually solitary, large, 2–2½ in. across, fleshy, yellow or straw-color, purple-lined, the lip deep purple; dorsal sepal lanceolate, the lateral broader and forming a manifest angled obtuse chin; petals narrowly linear-lanceolate; lip with the ovate-acute front lobe separated by a narrow isthmus. Tenasserim and Moulmein. C.O. Dend. 32. O. 1910, p. 122. J.H. III. 57:585.—*S. cymbidioides*, Kränzl. (Dendrobium cymbidioides, Lindl. D. triflorum, Lindl.). Raceme few-fld.; fls. pale yellow or straw-color, the lip yellow, suffused with rose or purple, with 2 orange spots at base of middle lobe; sepals and petals similar, acute, oblong-lanceolate, the sepals forming a very short rounded chin; lip with the middle lobe ovate-cordate, obtuse, longer than broad. Java and Philippines. G. 33:417. G.W. 14, p. 405. G.C. III. 37:15.—*S. Lóbbii*=Bulbophyllum.—*S. Treacherianum*, Kränzl. (Dendrobium Treacherianum, Reichb. f.). Raceme 3–5-fld.; fls. rose, the front part of lip yellow; dorsal sepal and petals linear-lanceolate, the lateral sepals triangular, forming a round chin, all the parts acuminate; lip with middle lobe linear-oblong, acuminate, deflexed. Borneo. B.M. 6591. J.H. III. 48:137.

GEORGE V. NASH.

SARCOSTÉMMA (name refers to the fleshy corona). *Asclepiadàceæ*. A few small-fld. more or less succulent leafless trailing or twining shrubs of the dry parts of tropical and subtropical regions of the Old World, to which N. E. Brown refers a plant long known as a Euphorbia. Fls. greenish, yellowish, or white, in sessile terminal or lateral umbels; corona double, the outer part ring-like or cup-shaped and truncate or shortly lobed, the inner part of 5 fleshy erect lobes; pollen-masses solitary in each anther-cell, pendulous. *S. viminàle*, R. Br. (*Tithýmalus péndulus*, Haw. *Euphòrbia péndula*, Link), grows in Trop. Afr.: trailing, twining, or bush-like, woody below, the lvs. sometimes represented by minute ovate bracts: corolla rotate or somewhat campanulate, greenish white or sulfur-colored. *S. Brunoniànum*, Wight & Arn., of India, has yellow fls. The sarcostemmas require the treatment given ceropegias and similar succulents.

SARGENTODÓXA (after C. S. Sargent, director of the Arnold Arboretum of Harvard University; and Greek, *doxe*, glory). *Lardizabalàceæ*. A woody vine, with deciduous 3-foliolate lvs. and dicœcious, yellow campanulate fls. in pendulous racemes and with frs. consisting of berry-like bluish black ovoid carpels. Staminate fls. 6-merous; sepals petaloid; petals wanting; nectaries minute, suborbicular; stamens with short filaments and oblong anthers: fr. consisting of ovoid stipitate carpels each with 1 ovoid, glossy black seed. Differs from all members of the family by its numerous 1-ovuled carpels. One species in Cent. China. A handsome vigorous-growing vine with rather large foliage and fragrant yellow fls. appearing with the leaves. Probably not hardy N. Prop. is by seed and by layers or cuttings. **S. cuneàta**, Rehd. & Wilson (*Holbèllia cuneàta*, Oliver, partly). Climbing, to 20 ft., glabrous: lvs. long-petioled; lfts. 3, the middle one stalked, rhombic to rhombic-obovate, 3–5 in. long, the lateral ones sessile, very unsymmetrical, ovate, slightly larger than the terminal one: staminate racemes 4–5 in. long; fls. nearly ½in. long, slender-stalked, yellow, fragrant; sepals narrow-oblong; stamen much shorter; ripe carpels ½in. long on a stalk of about equal length. H.I. 19:1817 (excluding the fruits, which belong to Sinofranchetia).

ALFRED REHDER.

SARMIÉNTA (named after Mart. Sarmiento, a Spanish botanist). *Gesneriàceæ*. A glabrous shrub, creeping or clambering over trees and rocks, to be grown in a moist greenhouse: sts. slender: lvs. opposite, rather fleshy, entire or few-toothed: fls. red, peduncled at the axils, solitary; calyx free, 5-parted, segms. narrow; corolla-tube elongate, ventricose, limb slightly oblique, lobes 5, rounded, spreading; stamens 2, posterior perfect, 2 anterior staminodea; disk obsolete; ovary superior.—One species, Chile, *S. rèpens*, Ruiz & Pav. Sts. slender: lvs. rather small, somewhat fleshy: fls. scarlet, axillary and solitary; calyx 5-parted; corolla-lobes 5, rounded and spreading. Summer. G.C. III. 29:303. F.S. 16:1646. J.H. III. 47:413.—It is said that it does not always thrive very well in cult. and that it should be planted in soft peat mixed with sphagnum and charcoal and either in a small pan or orchid-basket. It likes plenty of water, shade from bright sunshine and a position near the glass in a moist house.

SAROTHÁMNUS SCOPÀRIUS: *Cytisus scoparius*.

SARRACÈNIA (Dr. D. Sarrasin, of Quebec, a well-known physician and naturalist of his day, who sent *S. purpurea* to Tournefort nearly two centuries ago). *Sarraceniàceæ*. PITCHER-PLANT. INDIAN PITCHER-PLANT. SIDE-SADDLE PLANT. DEVIL'S BOOTS. FOREFATHER'S CUP. HUNTSMAN'S CUP. TRUMPETS. WATCHES. Pitcher-plants of swamps and savannas of the eastern United States, grown for their great oddity.

Acaulescent perennial herbs, with hollow radical lvs. usually provided with a lid or expanded blade, with a wing or keel on one side, variously colored: fl. single, terminating a naked scape, nodding, perfect, the parts mostly free and distinct; sepals and petals each 5, the latter incurved and deciduous, the sepals thick and persistent; bracts 3 beneath the calyx; stamens many; ovary globose, 5-celled, with 1 short style bearing a broadly expanded umbrella-like 5-rayed structure on the margin of which are borne the stigmatic surfaces: fr. a loculicidally 5-valved many-seeded dehiscent caps.

The family consists of three genera, Darlingtonia, Heliamphora, each with a single species, and Sarracenia, with seven species. The present genus is confined to North America, and almost wholly to the region east of the Mississippi. The most widely distributed species is *S. purpurea*, that extends from Florida and Alabama to Labrador and Minnesota. The others occur from southern Virginia to Florida and eastern Texas. All grow in moist or even in swampy savanna lands, in black sandy humus soil. The striking and beautiful pitchered leaves, as well as the large handsome flowers, early attracted the attention of gardeners, so long ago even as three centuries. But the apparent difficulty of cultivation long prevented their becoming popular objects. The careful observations of Macbride and Mellichamp in the southern states, and later of J. Hooker in England, clearly proved that the pitchered leaves are carnivorous, and that they show a remarkable microscopic structure in connection with this habit. Such has caused them to become popular objects of

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study in the past three decades. All are perennial rhizomatous plants, that produce three to eight pitchered leaves in spring, and in some species (*S. Drummondii*, *S. psittacina*) another set of these, or of flat green leaves (*S. flava*, *S. Sledgei*), in autumn. When grown in sunny situations, the pitchered leaves are often richly mottled with crimson or white; sometimes even the entire leaf may be of a dark crimson-purple hue, and correspondingly attractive. Minute honey-glands occur over the exterior, which forms therefore the "alluring surface." But these are specially abundant over the inner lid surface, where they are interspersed with down-directed hairs that incline insects to move on to the upper part of the tube. So this inner lid area has been termed the "attractive surface." The upper third to half of the tube is extremely smooth, and affords little foothold for insects, which often tumble from it into the pitcher cavity. So this has been called the "conducting surface." Beneath it in *S. purpurea* is a wide glandular surface that is absent in the other species, although in some of them glands scattered

3549. Josselyn's picture, slightly reduced, of the "Hollow Leaved Lavender," 1672.

amongst fine hairs may occur. This area excretes a slightly viscous juice, which accumulates in the pitcher cavity, and which, as Mellichamp showed, readily wets and drowns any insect that falls into it. The lowest part of the pitcher in all species bears long delicate down-directed hairs that effectually prevent upward passage of insects, and so has been called the "detentive surface." The seven species vary in their carnivorous capacity, *S. flava*, *S. Sledgei*, and *S. Drummondii* being best; *S. minor* (*S. variolaris*), *S. purpurea*. and *S. rubra* being rather poor; while *S. psittacina*, with its small flat pitchers, catches relatively few. The insect prey is not digested, but its dissolved material is either absorbed by the pitcher walls, or rotting inside the decaying leaves, affords valuable nitrogenous food for the roots. But an over-abundant animal diet often causes browning and decay of the leaves, so that some gardeners have advised plugging with cotton wadding.

The pendent flowers vary in size from an inch to 3 inches across, and in color from pale lemon-yellow, as in *S. minor*, to deep crimson, as in *S. Drummondii* and *S. rubra*. Each lasts from eight to twelve days. The five spreading sepals inside three small bracteoles are more or less petaloid; the petals are large pendent banners, the stamens are numerous and discharge abundant pollen which early falls into the umbrelloid cavity of the style. The pistil consists of a five-celled ovary that is covered outside by crystalline nectar-secreting warts, and within bears many ovules; a style that expands above into a large umbrelloid structure with five marginal notches, at the base of each of which is a minute dry peg-like stigma. The entire pistil after pollination matures in about three months into a many-seeded capsule. Cross-pollination seems always to be necessary for formation of good seeds. This act, as well as hybridization of distinct species, can readily be effected if pollen from one flower that has been wetted by nectar from its ovarian surface be placed on the dry stigma of a flower on another plant. All of the seven species cross readily with each other, alike in the wild state and under cultivation, if flowers mature about the same time. Thus at various localities in western Florida and in Alabama, where the tall handsome species *S. flava*, *S. Drummondii*, and *S. Sledgei* grow, the writer has found hybrids at times to be nearly as abundant as either parent. The numerous artificial hybrids between the species, that are themselves fertile and give rise to second hybrids in which the characters of at least three parents may be blended, also testify to ease of hybridization. The seeds germinate readily in about four weeks if sown with chopped sphagnum moss on a moist sandy muck. After production of the linear cotyledons, each seedling plant forms pitchered leaves that successively increase in size till good specific characters are shown by the second year.

The larvæ of certain moths, flies, and beetles at times prey on the pitchers, while the rhizomes may be excavated and destroyed by still another type. Careful detection and destruction of the infested leaves or pieces of rhizome are recommended. Mosquitos also may breed in the liquid of the pitchers of *S. purpurea*. All of the species succeed well under cultivation if grown in pots filled with fine sandy muck, from which, while decaying, humic acid constituents are evolved. Alkaline waters are always detrimental. In this respect they require the same treatment as do other swamp or semi-swamp plants of the eastern states. They should also have a bright sunny southeastern exposure, should be kept near the glass if grown in greenhouses, and the pots should stand permanently in about an inch of water. All can endure a temperature that approaches the freezing-point in winter.

The writer has monographed the genus in Engler's "Pflanzenreich," Vol. 4, No. 110 (hft. 34, 1908). A useful synopsis, along with some helpful figures, was given by Masters in 1881 (G.C. II. 15, 16. 1881).

The sarracenias have always excited the interest of the curious, and many of the native haunts have been depleted. In his "New England's Rarities," 1672, Josselyn gives a picture (Fig. 3549) of what he calls the "Hollow Leaved Lavender," and the following account of the plant we now call *Sarracenia purpurea*: It "is a Plant that grows in salt Marshes overgrown with Moss, with one straight stalk about the bigness of an Oat straw, better than a Cubit high; upon the top standeth one fantastical Flower, the Leaves grow close from the root, in shape like a Tankard, hollow, tough, and alwayes full of Water, the Root is made up of many small strings, growing only in the Moss, and not in the Earth, the whole Plant comes to its perfection in August, and then it has Leaves, Stalks, and Flowers as red as blood, excepting the Flower which hath some yellow admixt. I wonder where the knowledge of this Plant hath slept all this while, i. e. above Forty Years."

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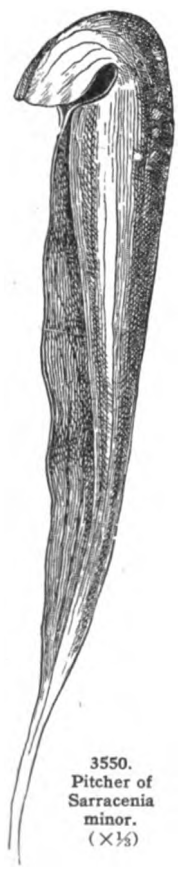
I. Species.

A. *Pitchers erect: fls. yellow or whitish yellow.*

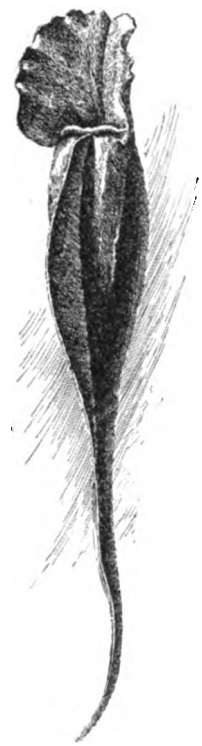
1. **minor,** Walt. (*S. variolàris,* Michx. *S. adúnca,* Smith). Fig. 3550. Pitchers erect, 8–24 in. long, gradually enlarging upward, with white areoles and often brownish red streaks above; lid cucullate, incurved over orifice; wing broadest in middle, narrowed above and below: fl. 1–2 in. wide, with pale yellow petals. Moist savanna lands, S. N. C. to N. Fla. B.M. 1710. L.B.C. 9:803. Mn. 4:1. Gn. 48, p. 203.

2. **Slédgei,** Macfar. (? *S. Gronòvii* var. *alàta* and *S. flàva* var. *crispàta* of authors). Pitchers erect, 12–30 in. long, trumpet-shaped, green with purple veins above, or greenish purple throughout; lid vertical or often slightly incurved, ovate-cordate; wing as in last: fls. 1½–2½ in. wide; petals whitish yellow to yellow, often fading to white, odor agreeable. Savanna swamps from west side of Alabama and Mobile rivers to E. Texas, often covering wide areas of marshland. —Very uniform in structure, but varying in color from green to dark claret in the pitchers; often confounded in the past with *S. flava,* which does not occupy the same area. Frequently hybridizes with *S. Drummondii* in nature to form *S. areolata.*



3550. Pitcher of Sarracenia minor. (×⅓)

3. **flàva,** Linn. Pitchers erect, 10–34 in. long, trumpet-shaped, with prominent longitudinal veins, yellow-green to green, often crimson throat, or deep crimson throughout; lid ovate-orbicular, slightly inflexed over mouth, with strong median nerve ending in mucro; wing narrow, uniform in width: fls. 2–3½ in. wide, flavous yellow, odor rather pungent. Abundant over swamps and savannas, often in humus-sand that becomes dry in summer but moist in winter; S. Va. to W. Fla. B.M. 780. L.B.C. 20:1957. R.H. 1852:121. F.S. 10:1068, 1069. G.C. II. 16:11, desc. Gn. 30, p. 367; 48:202; 57, p. 326. Mn. 2:113. Var. **atrosanguínea,** Bull (Mast.; G.C. 1881). Pitcher and lid dark crimson-claret. G.C. II. 16: 13. I. H. 27:386. Not uncommon from N. to S. C. over the coastal plain region. Var. **limbàta,** Bull. Lvs. medium to large, margin of operculum crimson. A rare form. Var. **máxima,** Mast. Lvs. large, uniformly yellowish green. Frequent in S. N. C. Var. **mínima,** Mast. Lvs. small, 9–12 in., pale green with purple veins over tube and lid. Occasional with the type form. Var. **ornàta,** Bull (*S. Fildesii,* Hort.). Lvs. 26–32 in., throat of pitcher and base of lid furnished with purple radiate lines. Frequent in N. and S. C. Var. **Rugélii,** Shuttl. (*S. erýthropus,* Bull). Lvs. large, 26–34 in., top of pitcher and base of lid dark crimson. Frequent throughout Ga. and W. Fla.



3551. Pitcher of Sarracenia purpurea. (×⅓)

AA. *Pitchers erect to decumbent: fls. crimson to purple-red.*

4. **rùbra,** Walt. (*S. Sweètii,* DC. *S. Gronòvii* var. *rùbra,* Wood. *S. mìnor,* Sweet). Pitchers erect, 6–20 in. long, slender, enlarging upward, tubular above, green to purple-veined over upper part of tube and lid; lid ovate, slightly concave and inflexed over mouth; wing rather wide, nearly uniform, from middle to top of pitcher: fls. ¾–1¼ in. wide, petals crimson, scent of sweet violets. Moist to dry savanna lands, usually in shade, from N. C. to N. W. Fla.; the most delicate and graceful species of the genus. B.M. 3515. L.B.C. 12:11. Var. **acuminàta,** DC. Lid ovate, apex acuminate. All transitions occur between this and the type species.

5. **Drúmmondii,** Croom (*S. lacunòsa,* W. Bartram. *S. leucophýlla,* Raf. *S. undulàta,* Decne. *S. Gronòvii* var. *Drúmmondii,* Wood). Pitchers erect, 10–32 in. long, attenuate, trumpet-shaped, green below, richly purple-veined and with numerous rounded white areoles above and over lid; lid orbicular, nearly erect, margin undulate, beset within by numerous white bristle hairs: fls. on long peduncles 2–3 in. wide, greenish purple to deep purple. Often abundant in swamps and over wet savanna lands from S. Ga. through N. Fla. to E. Ala. F.S. 6:560; 10:1071, 1072. G.C. II. 15:633; 16:8.—The richest in color and most striking in aspect of the genus; well worthy of cult. in every greenhouse collection. Var. **álba,** Hort. Pitchers tall, strong, green with pure white areoles above. Occasional alongside the type in S. Ga. and W. Fla. Var. **rúbra,** Hort. Pitchers attenuate, deep purple above. At times found growing with the type-species in W. Fla. The var. **undulàta,** Hort., scarcely differs from the type except in the rather more undulate margin to the lid.

6. **purpúrea,** Linn. The common pitcher-plant of the N. and the one on which the genus was founded. Fig. 3551. Pitchers ascending, in rosettes of 3–6, 2–10 in. long, widest toward middle, narrowed below and upward, green to dark purple; lid upright or slightly inclined outward with fine hispid hairs over inner lid or attractive surface; wing broad, prominent: fls. 1¼–1¾ in. wide; sepals and petals greenish purple to purple. In wet sandy muck or by swamp margins from Labrador and Minn. to N. Fla. and Ala.; flowering from fourth week in March in N. Fla. to second week of Aug. in Lab. B.M. 849. L.B.C. 4:308. F.S. 10: 1076. G.C. II. 15:821. Mn. 1:81. G.L. 27:179.—Very variable in coloring from bright green in shady places to dark purple in sunny situations. According to Loddiges, writing in 1823, this species was "cultivated before the year 1640 by Tradescant, who was gardener

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to King Charles the First." Var. **heterophýlla**, Eaton. Lvs. pale green: fls. yellow-green to yellow. Very rare in Mass., W. N. Y., and S. N. J.

7. **psittacìna**, Michx. (*S. calceolàta*, Nutt. *S. pulchélla*, Croom). Pitchers procumbent in radial rosettes, 2–6 in. long, enlarging from base to hooded apex, green with purple and white veins or areoles to claret-purple throughout; apex of tube psittacoid, forming with fused lid an incurved margin to pitcher-orifice; wing narrow to wide vertical in position: fls. ¾–1¼ in. wide, greenish purple to purple. Often abundant in pine-barren swamps of Ga., N. Fla., and westward to La. F.S. 7:268, desc.; 20:2063. G.C. II. 15:816. F. 1877, p. 254.—This species flourishes well under cult. when treated as a semi-aquatic, that is with its roots largely submerged in water.

II. Natural and Artificial Hybrids.

8. **Atkinsoniàna**, Nichols. A hybrid of like parentage as *S. Stevensii*.

9. **areolàta**, Macfar. (*S. Sledgei* × *S. Drummondii*). Pitcher elongate-tubular, green below, purple-veined and areolate above and over lid. Lid circular-cordate, margin somewhat undulate, with fine white hairs within: fls. 2–2½ in. wide, yellowish purple.—This is a frequent hybrid wherever both parents occur near each other. It is specially abundant from near Mobile, Ala., westward for 30 miles, and thrives readily in cult. if grown like both parents with the roots largely submerged in waters that have a humic acid reaction.

10. **cantabrigiénsis**, Lynch. A cross of *S. Drummondii* and *S. minor* (*S. variolaris*) that shows intermediate form and coloring between the parents. Raised by Lynch in Cambridge Botanic Garden, England.

11. **Catésbæi**, Ell. A hybrid between *S. flava* and *S. purpurea*, that is common throughout the southern states. It was first described by John Ray fully 200 years ago from specimens sent to him from this country. The writer has noted as many as 117 specimens in a forenoon near Ponce de Leon, Fla. It is easily cult., and produces pitchers and fls. that are the most striking and beautiful of the genus.

12. **Chélsonii**, Veitch. A cross of *S. rubra* with *S. purpurea* raised in the Veitch gardens, and that shows intermediate characters. The writer has once only found 2 wild examples in E. Ala., the comparative rarity seeming to be due to a difference of nearly 3 weeks in the flowering periods of the parents. G.C. II. 13:725; 15:817. I.H. 27:388. S.H. 1:189.

13. **Clàytonii**, Nichols. Origin and parentage unknown; it is thus described by Nicholson: "pitchers beautifully colored vinous purple at the summit, shading to crimson."

14. **Cookiàna**, Hort. Parentage unknown, said to be one parent of *S. Sanderæ*.

15. **Coûrtii**, Hort. One of Court's hybrids between *S. purpurea* and *S. psittacina*, and combining in exact and striking manner the details of both parents. Pitchers semi-decumbent, 6–8 in. long, greenish red becoming deep crimson upward. Orifice and incurved rim wider than in *S. psittacina*. S.H. 1:177.

16. **crispàta**, André. A name of doubtful value, that seems to have been variously applied by different authors. Probably either *S. Sledgei* or a hybrid of *S. flava* with *S. minor*. The writer has gathered undoubted examples of the last-named cross near Summerville, S. C. Pitchers erect, green with whitish areolations above, lid broadly ovate, somewhat constricted over orifice: fls. bright yellow. I.H. 27. 387. G.C. II. 15:633; 16:9.

17. **decòra**, Hort. A probable cross between *S. psittacina* and *S. minor*, and so of like but more recent parentage with *S. formosa*.

18. **excéllens**, Nichols. A probable hybrid between *S. minor* and the var. *alba* of *S. Drummondii*.

19. **excúlta**, Nichols. A hybrid of like parentage as *S. Moorei*, which see.

20. **exornàta**, Nichols. Said to be a hybrid of *S. purpurea* with *S. crispata*.

21. **Fárnhami**, Hort. A beautiful hybrid said to be a cross between *S. Drummondii* and *S. rubra*, and which combines details of both parents in pitcher and fl. The writer has collected a single wild example near Milligan, Fla., where the former parent is common and the latter is sparse.

22. **flambeau**, Hort. A hybrid of doubtful origin and parentage, cult. at Kew Gardens. Possibly a cross of *S. purpurea* with *S. minor*, and so of like origin as *S. Swaniana*.

23. **formòsa**, Veitch. Pitchers ascending, intermediate between the parents *S. psittacina* and *S. minor* as to shape, color, and lid-formations. Gt. 32:317.

24. **illustràta**, Nichols. Lvs. elongate-tubular, veins becoming deep crimson upward, lid cordate, sightly acuminate, with crimson veins. Between *S. flava* var. *picta* and the hybrid *S. Stevensii*, so with 3 parts of *S. flava* "blood" and 1 of *S. purpurea*.

25. **Maddisoniàna**, Nichols. A hybrid with the same parentage as *S. formosa*, but in reversed relation. Pitchers ascending, short, with dull purple veins and fine whitish areoles upward, cucullate end of tube and fused lid richly white and purple-veined.

26. **Mandaiàna**, Hort. A natural hybrid with like parentage to *S. Moorei*. Over wide areas from N. Cent. Fla. to the Alabama River it is nearly always to be found wherever both parents are common. A tall handsome type with crimson throat of *S. flava* var. *Rugelii*, and the crimson and white areolations of *S. Drummondii*. It grows well under cult. First sent out by Pitcher & Manda.

27. **melanorhòda**, Veitch. A cross between *S. Stevensii* and *S. purpurea*, so with 1 part parentage of *S. flava* and 3 parts *S. purpurea*. Pitchers ascending, 6–12 in. long, widening from base to mouth, lid erect or slightly incurved with undulate margin and within showing short hairs, top of pitcher and lid crimson-green with dark crimson hispid veins, wing prominent, broadest in middle.

28. **Mitchelliàna**, Nichols. (*S. Drummondii* var. *rubra* crossed by *S. purpurea*). Pitchers almost erect, funnel-shaped, pale green with red veins and whitish areoles above, lid cordate-reniform with undulate margins, and deep crimson veins around white areoles. —The artificial hybrids were sent out by Bull. The writer has got a few like plants growing wild near Bay Minette, Ala., where both parents are common.

29. **Moòrei**, Mast. This, the first artificial hybrid produced, was raised by Moore, of Glasnevin, as a cross of *S. flava* with *S. Drummondii*. Pitchers tall, erect, tubular, with strong veins, light green below, crimson-veined and faintly white-areolate above with usually rich crimson posterior throat area; lid crimson, and white-areolate with slightly undulate margin and hispid hairs within: fls. of a yellowish rose-to-purple color. As noted above *S. Mandaiana* is a natural hybrid of similar parentage. G.C.II. 1: 702, desc.; 16:44.

30. **Pátersonii**, Hort. A hybrid raised by Patterson, orchidologist of Bridge of Allan, Scotland, and with parents like No. 28.

31. **Pòpei**, Hort. Pitchers narrow, erect, with crimson veining around mouth and ovate-acuminate lid: fls. yellowish crimson with characters intermediate between those of parents. G.C. II. 16: 41. Raised by Pope of Glasnevin Garden, Dublin, between *S. flava* and *S. rubra*. It seems rarely to be produced in nature, since the former flowers about 3 weeks before the latter.

32. **porphyroneûra**, Hort. Probably a synonym of, and of like parentage with *S. Catesbæi*, and first exhibited about 1882.

33. **Sánderæ**, Nichols. An artificial cross of *S. Drummondii* var. *alba* with *S. Cookiana* of unknown parentage.

34. **Sanderiàna**, Hort. A garden hybrid of *S. Drummondii* var. *rubra* and *S. Farnhami*, distributed by Sander. Cult. at Kew, and of great beauty.

35. **Stèvensii**, Mast. Similar in appearance to, and of like origin as, the natural hybrid *S. Catesbæi*. Raised by Stevens, gardener at Trentham, England. G.C. II. 16:40.

36. **Swaniàna**, Nichols. Pitchers ascending to suberect, greenish crimson above with crimson veins and whitish areoles, lid ovate-cordate with slightly bilobed apex, similarly colored as extremity of tube, wing broad in middle tapered toward extremities. According to Nicholson, it is "a handsome and well-marked hybrid between *S. variolaris* (*minor*) and *S. purpurea*."

37. **Tolliàna**, Nichols. Stated to be a hybrid of *S. Drummondii* var. *alba* and *S. flava*, but the writer considers it rather to be *S. flava* crossed by *S. purpurea*. So like *S. Catesbæi* and *S. Stevensii*.

38. **vittàta**, Nichols. Between *S. purpurea* and *S. Chelsonii*. Not in general cult.

39. **Williamsii**, Mast. Of same hybrid origin and aspect as *S. Stevensii*.

40. **Willisii**, Nichols. A beautiful but complex cross of *S. Courtii* (*S. purpurea* × *S. psittacina*) with *S. melanorhoda*, that is a hybrid of *S. Stevensii* (*S. purpurea* × *S. flava*) with *S. purpurea*. It more or less combines characters from all of the 3 species-parents, and is delicately colored pale green, white, and crimson.

41. **Wilsoniàna**, Nichols. Of same hybrid origin as *S. Stevensii* and others.

42. **Wrigleyàna**, Veitch. Reputed to be a garden cross between *S. psittacina* and *S. Drummondii* or the converse.

J. M. Macfarlane.

SARSAPARILLA of commerce comes from various species of Smilax. Wild sarsaparilla of America is *Aralia nudicaulis*.

SASKATOON. Fruit of a bush-like species of Amelanchier.

SÁSSAFRAS (Spanish, *Salsafras*, Saxifraga; medicinal properties similar to those of Saxifraga were attributed to it by Spanish discoverers). *Laurâceæ*. Sassafras. Ornamental trees grown for their handsome foliage assuming beautiful tints in autumn and for their bright-colored fruit.

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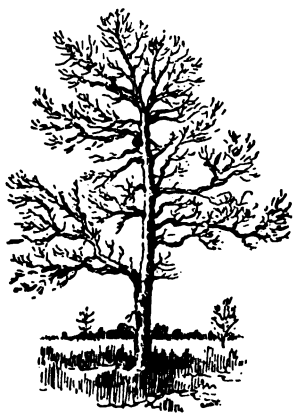
Deciduous: lvs. alternate, entire or 3-lobed, slender-petioled: fls. dicœcious, rarely perfect, apetalous; calyx 6-parted; stamens 9, the 3 inner ones furnished at the base with 2 stalked, orange-colored glands; staminodes 3 or wanting; anthers opening with 4 valves; ovary superior, 1-loculed: fr. an oblong-ovoid, 1-seeded, dark blue drupe surrounded at the base by the thickened scarlet calyx.—Two species, one in E. N. Amer. and one in China.



3552. Sassafras tree.

The sassafrases are handsome trees of pyramidal habit with rather large, entire or 3-lobed leaves and small yellow flowers in few-flowered racemes appearing in spring with the leaves and followed by ornamental dark blue fruits on red fleshy stalks. The native species is hardy North, while the Chinese one which is still little known in cultivation is somewhat tenderer. The American sassafras usually affects light lands, although it may grow in clay loams. It is a desirable tree for ornamental planting on account of its handsome light green foliage, which is interesting with its varying shapes and its orange-yellow or bright red color in autumn, and on account of its decorative bright-colored fruit. It prefers, at least in the North, a warm and sunny position. It is not easily transplanted when old on account of its long tap-roots. Propagation is by seeds sown as soon as ripe; also by suckers, which are often freely produced, and by root-cuttings.

variifòlium, Kuntze (*S. officinàle*, Nees. *S. Sássafras*, Karst. *Laùrus Sássafras*, Linn.). Figs. 3552 (winter tree), 3553. Tree, 30–60, or occasionally 90 ft. high: young branches bright green, pubescent: lvs. oval and entire, or 3-lobed almost to the middle, obtusish, silky-pubescent when young, glabrous at length, 3–4 in. long: fls. yellow, ¼in. across, glabrous inside, without staminodes, in several-fld. racemes, umbellate when unfolding, afterward at the base of the young branchlets; staminate fls. without rudimentary pistil; staminodes wanting: fr. ½in. high. April, May. Maine to Ont. and Mich., south to Fla. and Texas. S.S. 7:304, 305. Em. 2:360. G.F. 7:215. Gn. 31, p. 449; 63, p. 167. G.W. 13, p. 366. Var. **álbidum,** Fern. (*Laùrus álbida*, Nutt.). Buds and younger branches glabrous and glaucous: lvs. glabrous. Mass. to S. C. and Ky.

Tzûmu, Hemsl. (*Pseudosássafras Tzùmu*, Lecomte). Tree, to 100 ft.: lvs. similar in shape to those of the preceding species, 4–8 in. long: fls. perfect, smaller, pubescent inside, with 3 staminodes alternating with the 3 glandular stamens; the staminate fls. with rudimentary pistil: otherwise like the preceding species. Cent. China. H. I. 29:2833.

ALFRED REHDER.

SATUREÌA (the old Latin name used by Pliny), also spelled *Satureja*. Syn., *Calamíntha*. *Labiàtæ*. SAVORY. Hardy aromatic herbs and subshrubs, grown in borders for their flowers and also as pot-herbs.

Leaves entire, narrow and small or toothed, or broad and larger: floral whorls either axillary or in terminal spike-like racemes; calyx campanulate-tubular or tubular, rarely campanulate, 10–13- rarely 15-nerved, 5-toothed, sometimes 2-lipped; corolla-tube short or long, exserted, upper lip flat, entire or emarginate, lower lip expanded, 3-cleft, with flat lobes, the midlobe usually larger and emarginate; stamens 4: nutlets ovoid, smooth.—About 160 species in the warmer regions of both hemispheres.

A. *Plants annual.*

Ácinos, Scheele (*Calamíntha Ácinos*, Clairv.). Annual, herbaceous, about 6 in. high: sts. suberect, branched, pubescent or villous: lvs. ovate, rather obtuse, base narrowed, subserrate, green on both sides; floral lvs. similar, exceeding the fls.: floral whorls about 6-fld., distant; calyx 3–4 lines long, deeply 13-striate, hispid; corolla purple-blue, scarcely exceeding the calyx. Eu., Caucasus.—Escaped from cult. in N. Amer.

horténsis, Linn. (*Calamíntha horténsis*, Hort.). SUMMER SAVORY. Annual herb, pubescent: sts. erect, about 6 in. high or a little more: lvs. oblong-linear, acute, base narrowed to a short petiole; floral lvs. similar: floral whorls laxly somewhat 6-fld., in dense interrupted spikes; calyx scabrous-hispid on the nerves; corolla sparsely pubescent outside, scarcely exceeding the calyx. Eu., and widely escaped from cult.

AA. *Plants perennial.*

B. *Lvs., at least some of them, subrotund.*

alpìna, Scheele (*Calamíntha alpìna*, Lam.). Perennial, diffuse, pubescent or villous: sts. much branched and somewhat woody at base, about 6 in. high: lvs. petioled, subrotund or ovate, scarcely serrate; floral lvs. sometimes narrower, about equaling the calyx: floral whorls 4–6-fld.; calyx subsessile, purplish; corolla larger, purple, throat strongly dilated. Medit. region.

córsica, Caruel (*Thỳmus córsica*, Pers. *Calamíntha córsica*, Benth.). Subshrub, perennial, small, much-branched, rather glabrous: lvs. scarcely 2 lines long, petioled, subrotund, entire, usually glabrous, sometimes pilose; floral lvs. similar: floral whorls on flowering branches, 1 or 2; calyx subsessile; corolla light purple. Corsica.

BB. *Lvs. ovate, oblong-linear or spatulate.*

montàna, Linn. (*Calamíntha montàna*, Lam. *C. officinàlis*, Moench). WINTER SAVORY. Subshrub, glabrous or slightly scabrous-pubescent: sts. woody at base; branches erect or ascending, 6–12 in. high: lvs. oblong-linear, acute or inferior spatulate or cuneate, obtuse; upper and floral lvs. narrower: floral whorls many-fld., laxly secund, approximate in a spike or raceme; calyx campanulate, 10-nerved or rarely obscurely 13-nerved; corolla white or purplish. Eu., N. Afr., and widely cult.

vària, Webb & Berth. (*Thỳmus ericæfòlius*, Roth. *Micromèria vària*, Benth.). Subshrub, pubescent or villous: sts. procumbent, much branched, branchlets ascending, canescent-tomentose, rarely glabrous: lvs. sessile, lower ovate, upper lanceolate, fascicled at the axils, all obtuse, somewhat canescent beneath; floral lvs. minute: floral whorls 2–10-fld.; calyx erect, slightly pubescent, purplish; corolla scarcely exceeding the calyx. Canary Isls.

3553. Sassafras variifolium. (×½)

S. grandiflòra, Scheele (S. grandiflora, Mœnch.) Herbaceous perennial: lvs. ovate, serrated: sts. decumbent, branching from the base: fls. in axillary whorls, quite large, 1½ in. long, with a straight tube; upper lip flattened, purple. June, July.

F. TRACY HUBBARD.

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SATŸRIUM (Greek, *satyr; Satyrion* was the name given by Dioscorides to one of the orchids). Syn., *Diplécthrum*. *Orchidàceæ*. Terrestrial orchids with tuberous roots, some of the species adapted to the warmhouse, others to the coldframe.

Tuber undivided: lvs. few, on the lower part of the st., rarely many at the sides of the tall st.: fls. medium-sized or rather large, in often densely fld. spikes; bracts membranaceous or somewhat leafy, sometimes imbricate in the young spike and often strongly reflexed, in a dwarf species overtopping the fls.; sepals free, rather similar to the petals; labellum erect, broad-concave, galeate or cucullate undivided: caps. erect, oblong, not beaked.—About 125 species, India, Mascarene Isls., Trop. and S. Afr. Most of the species, of which several are more or less commonly cult. abroad, succeed well in a coldframe, in a compost of turfy peat, fibry loam and sand with plenty of drainage. Prop. by division of roots, made as fresh growth is commencing.

cárneum, R. Br. One to 2 ft. high: sts. stout: lvs. 2, radical, subsessile, ovate or orbicular-ovate: scapes with several ovate or spathaceous sheaths; spikes oblong, 3–8 in. long, dense, many-fld.: fls. large, pink or rose-colored; sepals and petals united at base, odd sepal lanceolate-oblong, obtuse, lateral sepals larger; petals elliptic-oblong; lip cucullate. S. Afr. B.M. 1512. G.C. III. 4:697. G.W. 2, pp. 349, 350.

nepalénse, Don. St. 6–30 in. high, usually very stout: lvs. few, oblong to linear-oblong, 4–10 x 2–4 in., rather fleshy, sessile: spike 1–6 in. long, densely fld.; bracts oblong or lanceolate, much larger than the fls.: fls. fragrant, white to rose-pink; sepals linear-oblong, obtuse; petals rather narrower, lip superior, broadly ovate, concave and strongly keeled on the back. Himalayas to Ceylon and Burma. B.M. 6625. Var. **ciliàtum,** Hook. f. (*S. ciliàtum*, Lindl.), is a small plant with the spurs hardly longer than the sepals. Himalayas.—This species and its variety require greenhouse heat.

sphærocárpum, Lindl. About 12–18 in. high: sts. stout: lvs. 2–4, suberect, ovate-oblong or elliptic-oblong, somewhat fleshy: scapes with a few large spathaceous sheaths; spikes 2–8 in. long, dense and many-fld.; bracts ovate or ovate-lanceolate: fls. large, white, variously blotched and sometimes suffused with red; sepals and petals united nearly to the middle, lanceolate-oblong, more or less recurved, lateral sepals broader than the other segms., lip cucullate, broadly elliptic-ovate. S. Afr. B.M. 7295.

S. aurantiacum, T. S. Ware, is a species with broad lvs., long and compact fl.-spike and rich orange fls. Probably of garden origin.

F. Tracy Hubbard.

SAUROMÀTUM (*saura*, lizard; referring to the spotted flower). *Aràceæ*. Perennial herbs, with unisexual naked flowers, grown for ornament.

Tubers bearing a single pedate lf. one year, the next year lvs. and fls.: petioles cylindrical, spotted below; blade pedately parted: peduncle short: spathe soon withering, its tube oblong, swollen at the base, more or less connate. its blade or banner long-lanceolate, black-purple, variously spotted.—Species 6, India, Java, and Trop. Afr. The following are hardy bulbous plants, with large and curious fls. The fls. are produced from Jan. until June, and the bulbs have kept well in a dry state for a year. There is little danger of the bulbs shriveling or rotting. Plant them 6 in. deep in pots or in the garden. Easily managed by the amateur.

guttàtum, Schott. Petioles 3 ft. long, not spotted; lf.-segms. 6–8 in. long, 2–3 in. wide, the lateral smaller: spathe-tube green on the back, 4 in. long, the upper third narrowed; blade 12 in. long, 2 in. wide below, gradually narrowing above, olive-green on the back, yellowish green within, with dense, irregular black-purple spots. Himalayas. J.F. 1:12. B.R. 1017 (as *Arum venosum*).

venòsum, Schott (*S. simlénse*, Schott.). Petioles spotted, 3½ ft. long; lf.-segms. 8–10 in. long, 4 in. wide, the lateral smaller: spathe-tube 3–4 in. long, purple on the back: blade 14–16 in. long, 3 in. wide below, about 1 in. wide from the middle to the apex, purple on the back, yellow within and with crowded oblong purple or black spots. Himalayas. B.M. 4465 and F.S. 13:1334 (both erroneously as *S. guttatum*).

S. brévipes, N. E. Br. Petiole up to 15 in. long, rose, the segms. of blade 5–9, 4–6 in. long, narrowly linear-lanceolate, caudate-acuminate: spathe shortly stalked, the tube swollen, 1½ in. long, pale yellowish green, faintly rose-spotted, the limb narrow, convolute, twisted, arching, 4–6 in. long, pale greenish or rose, bright red at throat; spadix as long as spathe, slender, rose below, orange above. Sikkim. B.M. 7940.

Jared G. Smith.
George V. Nash.†

SAÙROPUS (Greek for *lizard foot*). *Euphorbiàceæ*. Tropical shrubs rarely cult.: lvs. alternate, simple: fls. in axillary clusters, apetalous, sepals imbricate; no rudiment of a pistil in the staminate fls.; disk absent from the pistillate fls.; styles almost entire; ovules 2 in each of the 3 cells of the ovary: fr. more or less fleshy.—About 20 species of Trop. Asia and South Sea Isls. Related to Phyllanthus. *S. álbicans*, Blume, occurring in many varieties from Ceylon to the Philippines, has edible fr. and has been in cult. in Eu.

J. B. S. Norton.

SAURÙRUS (Greek, *lizard's tail*, referring to the curve of the spike of fls.). *Saururàceæ*. Lizard's Tail. Perennial marsh herbs, suitable for the bog-garden.

Erect: lvs. heart-shaped, converging-ribbed, petioled, without distinct stipules: fls. crowded in a slender-naked-peduncled terminal spike or raceme; perianth none; stamens mostly 6 or 7, hypogynous: fr. somewhat fleshy, wrinkled, of 3–4 carpels united at base and indehiscent; seed usually solitary.—Two species, one in N. Amer., the other in Asia.

3554. Saururus cernuus. (×⅛)

cérnuus, Linn. Lizard's Tail. Fig. 3554. Height 2–5 ft.: lvs. cordate, acuminate: fls. white, fragrant, in a spike which is nodding at the end; bract lanceolate; filaments long and capillary. In swamps and shallow water, Conn. to Ont., Minn., Mo., and southward. June–Aug. B.B. 1:482.

Lourèirii, Decne. (*S. chinénsis*, Hort.). Perennial, from a strong rhizome: sts. stout, 12–16 in. high, round below, angled above: lvs. alternate, petioled, cordate-based, ovate, acute, 4–5 in. long, bright green: spikes cylindrical, 4–5 in. long, axillary in the uppermost lvs., which turn yellowish white at the time of flowering; filaments very short. China and Japan. R.H. 1908, p. 395.

F. Tracy Hubbard.

SAUSSÙREA (named after Theodor de Saussure, 1767–1845, or for his father, Horace Benoit de Saussure, 1740–1799). *Compósitæ*. Annual, biennial, or perennial, glabrous or tomentose herbs of various habit, sometimes planted in the garden for ornament.

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Leaves unarmed, alternate, entire, toothed, pinnatifid or pinnatisect: heads narrow or broad, sometimes crowded on the dilated top of a simple st., peduncled, or sessile, solitary, corymbose or panicled; fls. purple or bluish, all perfect and similar, tube slender, limb narrow 5-cleft; involucre ovoid-oblong, globose or hemispheric, bracts not spinescent: achenes glabrous, oblong, 4-ribbed.—About 200 species, temperate regions of Eu., Asia, and N. Amer., mostly in the mountains. *S. gossipiphora*, Don. Perennial, densely long white or yellowish matted woolly: st. 6–12 in. high, hollow, clavate, often 4 in. broad at top: lvs. sessile, linear, remotely toothed or runcinate-pinnatifid: heads very many, cylindric; involucre-bracts linear-oblong, shining: achenes narrowly obovoid. Himalayas and China. G.C. III. 51:85. *S. leucòma*, Diels. Plant 4–9 in. high: lvs. basal, narrowly pinnate, upper almost linear, the blade being entirely sacrificed to the development of the abundant cottony tomentum in which practically the whole plant is smothered, the fl.-heads alone are free of it and form a compact mass 2–3 in. diam. China. G.C. III. 51: suppl. Feb. 10. *S. Veitchiàna*, Drumm. & Hutchins. Herb, 2–3 ft. high, with about 2–5 leafy scapes from a tufted crown: fl.-sts. rigid, floccose upward: lvs., the lowest, 10 x 2 in., oblong-linear, green above, loosely hairy below; the upper ovate-lanceolate; bracts blush-pink or purplish: heads nearly ovoid, over 1 in.; florets deep purple. China. B.M. 8381. G.C. III. 50:85.

F. Tracy Hubbard.

SAVORY. Sweet-herbs.

Summer savory is *Satureia hortensis* of the *Labiàtæ*. Cultivated in kitchen-gardens for its aromatic green parts, which are gathered in midsummer for flavoring meat, dressings, and other culinary preparations. The slender, erect, branching, herbaceous stems, 10 to 12 inches tall, bear soft narrow green leaves and in summer clusters of pink, purplish or white flowers, which are followed by brown ovoid seeds whose vitality lasts three years. Propagation is by means of seed, which is sown in drills 12 to 18 inches apart in April or May in light, mellow, well-drained loam of moderate richness. When 2 to 3 inches tall the plants are thinned to 5 or 6 inches asunder, or for early crop they may be transplanted from hotbeds sown in March.

Winter savory (*S. montana*) is a hardy European perennial species, having much the qualities of the annual, but with woody, slender, very branching stems 12 to 16 inches tall, narrow, very acute leaves, white, pink or lilac flowers and brown seeds, whose average vitality is three years. It may be managed like thyme.

M. G. Kains.

SAXEGÓTHÆA (in honor of Prince Albert of Saxe-Coburg-Gotha, consort of Queen Victoria). *Taxàceæ*. An evergreen tree, native of Chile, similar in habit and foliage to the yew: monœcious, staminate fls. in cylindrical spikes clustered at the end of the branchlets; pistillate fls. solitary at the end of branchlets: fr. a small stalked irregularly subglobose cone with the scales terminating in spiny flattened points; seeds ovate, keeled, lustrous, brown. The plant is not hardy North and it is doubtful whether it is in cult. in this country; it is of slow growth and has no particular ornamental merit, but botanically it is very interesting. Prop. is by intro. seeds or by cuttings treated like those of taxus; it also may be grafted on taxus or podocarpus. **S. conspícua**, Lindl. Tree, to 40 ft., with whorled drooping branches: lvs. linear or linear-lanceolate, spiny-pointed, at the base abruptly contracted into a short decurrent stalk, dark green above, with 2 broad white lines beneath, ½–1 in. long: staminate spikes ¼in.long: fr. about ½in. across. J.H.S. 1851, pp. 260, 261. F.S. 7, p. 84. J.F. 2, pp. 69, 71. B.H. 6, p. 309 (pl. 75). I.H. 1, p. 16. G.C. III. 2:684; 5:782.

S. grácilis, Hort.=Podocarpus nubigena.

Alfred Rehder.

SAXÍFRAGA (Latin, *rock* and *to break;* said by some to refer to the fact that many of the species grow in clefts of rock, by others to the supposition that certain species would cure stone in the bladder). Including *Bergènia* and *Peltiphýllum*, genera which are maintained as distinct by Engler in his last treatment of the group. *Saxifragàceæ*. Saxifrage. Rockfoil. Chiefly perennial herbs, but a few species are annual and a few others biennial, while some others are subshrubby; useful for border planting, rockeries, and alpine gardens, and much prized by fanciers, particularly abroad.

Plants usually with more or less developed caudicles which are either above or below ground: lvs. commonly clustered at the base and most often alternate on the sts., very variable in shape: infl. paniculate, corymbose, racemose or solitary: fls. as a rule not large, white, yellow, red, pink, or purple; calyx either free from or partly adnate to the base of the ovary, the tube short or elongated, 5-cleft or 5-parted; petals usually equal but occasionally decidedly unequal; stamens 10, rarely 5: fr. a 2-beaked, 2-celled caps. opening down or between the beaks, or sometimes 2 almost separate follicles; seeds numerous.—About 400 species from a horticultural viewpoint or approximately 250 botanically speaking. Temperate (principally alpine) and northern boreal regions, rare in Asia, very few in S. Amer. and lacking in Austral., S. Afr., and the Pacific islands. In preparing the following treatment of the genus and in the arrangement of species, Engler, in Engler & Prantl's Pflanzenfamilien, has been followed with the exception above mentioned, while the specific delimitation is largely based on Engler's Monographie der Gattung Saxifraga, 1872, with cultural and other horticultural information drawn from Irving & Malby's Saxifrages. The true saxifrages, so-called (excluding Bergenia and Peltiphyllum), have been separated into several genera at different times. The horticultural species mentioned in this treatment which are native of N. Amer. have been divided among the following genera: Saxifraga, Muscaria, Chondrosea, Micranthes, Spatularia, Leptasea, Heterisia, Peltiphyllum and Antiphylla. See Small in N. Amer. Fl., vol. 22, pt. 2, 1907.

Saxifrages are various in habit and stature, but they are mostly low and spreading with rosulate or tufted root-leaves. Most of the species in cultivation are grown as rock-garden plants, although the large-leaved members of the Megasea or Bergenia section are sometimes used as border plants. Owing to the small attention given to rock- and alpine-gardening in America, the saxifrages are little known to our horticulturists. Most of them are abundantly hardy as to frost, but are likely to suffer from the dryness and heat of the American summer. Partial shade in summer is essential for the best results with most of the species. In winter the stools should be given ample covering of leaves. The most useful kinds for this country are the species of the Megasea section. These are low plants of bold habit, and are admirably adapted for rockwork and for spring forcing under glass. Fig. 1819, Vol. III, shows a clump of these plants in the lower left-hand corner.

The alpine species are mostly dwarf plants with more or less persistent foliage. Many of them, as *S. oppositifolia*, make dense moss-like mats; others, of which *S. Aizoon* may be taken as a cultural type, produce a dense rosette of leaves at the surface of the ground, from which arises a flower-scape. Some of these forms are very interesting because of the vari-colored or silvery effect produced by natural incrustations of lime on the leaves, particularly on the leaf-edges. Give shade.

Most saxifrages make stolons and offshoots freely, and by these the plants are easily propagated; they are also increased by division. Some make bulblets and multiply in this manner.

The number of species of saxifrage cultivated abroad in rockeries and alpine-gardens is very large and there are many fanciers who have made very large collec-

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CIII. Greenhouse group of parent and hybrid sarracenias.

1, S. purpurea; 2, S. psittacina; 3, S. Stevensii × (S. flava × S. purpurea); 4, S. Chelsonii × (S. purpurea × S. rubra); 5, S. rubra; 6, S. Sledgei; 7, S. Moorei × (S. flava × S. Drummondii); 8, S. minor; 9, S. areolata × (S. Drummondii × S. Sledgei); 10, S. Drummondii; 11, S. flava. Between 8 and 10 is a hybrid of S. Mitchelliana × (S. Drummondii × S. purpurea).

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tions of them. The following account has attempted to include those species which are in more general cultivation, although there are numerous others which occur in some of the collections, and it includes the better known hybrids and certain seedlings. A large part of these species are either very rare or lacking in American gardens. Very few of the species have been modified to any extent under domestication.

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INDEX, CONTINUED.

KEY TO THE SECTIONS.

A. *Lvs. glandular-punctate, usually large and thick; the petiole sheathed at the base.*
I. BERGENIA. Species 1–5.

AA. *Lvs. not glandular-punctate (sometimes pitted), usually not large; the petiole not sheathed at the base.*

B. *Seeds spherical: the lvs. brown-striate.*
II. CYMBALARIA. Species 6, 7.

BB. *Seeds fusiform or elongated: the lvs. usually not brown-striate.*

C. *Pits absent on the lvs. (some species of Section Trachyphyllum have 1 pit at the apex of the lf.): lime secreted.*

D. *Plants annual or biennial: caudicles absent.*
IV. TRIDACTYLITES. Species 10.

DD. *Plants perennial (No. 20 may occasionally be biennial): caudicles present.*

E. *Caudicles subterranean.*

F. *The caudicles annual, biennial, or perennial; the secondary shoots with shortened internodes, bulbous and separating from them with age.*
V. NEPHROPHYLLUM. Species 11–13.

FF. *The caudicles perennial; the secondary shoots permanently attached to them.*

G. *Lvs. peltate.*
XV. PELTIPHYLLUM. Species 100, 101.

GG. *Lvs. not peltate.*

H. *Caps. somewhat inflated, splitting above the middle.*
VII. BORAPHYLLA. Species 37–47.

HH. *Caps. not inflated, splitting below the middle.*

I. *Fls. white.*
III. MISCOPETALUM. Species 8, 9.

II. *Fls. yellow.*
IX. HIRCULUS. Species 52–54.

EE. *Caudicles above ground.*

F. *Petals unequal: plants mostly with runners.* VIII. DIPTERA. Species 48–51.

FF. *Petals equal.*

G. *Ovary more or less adnate with the calyx-tube.*

H. *Lvs. herbaceous, undivided or lobed.*
VI. DACTYLOIDES. Species 14–36.

HH. *Lvs. rigid, withering, commonly setose, not herbaceous.*
X. TRACHYPHYLLUM. Species 55–62.

GG. *Ovary entirely free.*
XI. ROBERTSONIA. Species 63–65.

CC. *Pits present on the lvs.: lime secreted.*

D. *Secondary shoots separating early from the caudicles, more or less stoloniferous, their apex with a rosette of lvs.*
XII. EUAIZOONIA. Species 66–77.

DD. *Secondary shoots remaining attached to the perennial caudicles.*

E. *The lvs. alternate.*
XIII. KABSCHIA. Species 78–96.

EE. *The lvs. decussately opposite.*
XIV. PORPHYRION. Species 97–99.

Unkeyed
XVI. HYBRIDS. Species 102–135.

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Section I. BERGENIA (MEGASEA).

A. *Margin of lf. not ciliate, but more or less undulate or crenate: lvs. not pubescent.*
B. *Scape and infl. glabrous.*
C. *Lvs. orbiculate-cordate*..... 1. **cordifolia**
CC. *Lvs. obovate to long-obovate, more or less cuneate at the base*..... 2. **crassifolia**
BB. *Scape and infl. pubescent*..... 3. **purpurascens**
AA. *Margin of lf. ciliate: lvs. sometimes pubescent.*
B. *Base of lf. distinctly cordate although narrow: calyx glabrous*..... 4. **ligulata**
BB. *Base of lf. usually narrowed to the petiole: calyx pubescent or at least puberulent*..... 5. **Stracheyi**

1. **cordifòlia,** Haw. (*Megásea cordifòlia*, Haw. *Bergènia cordifòlia*, Sternb.). Twelve to 20 in. high, robust: lvs. orbiculate-cordate, broad and fleshy, margin undulate-serrate, glabrous, shining; petioles long and thick: infl. a short, thick, angled, shiny scape: fls. clear rose, in dense nodding cymes partly hidden in the lvs.; pedicels short and thick; calyx-lobes short and broad; petals roundish. March–May. Siberia. Gn.M. 3:136.—Closely allied to *S. crassifolia* but differing in the broader cordate-based lvs. and in the rounder petals. Var. **álba,** Hort. (*Megásea cordifòlia* var. *álba*, Hort.). Fls. delicate blush-pink, not true white. Var. **grandiflòra,** Hort. Said to be unusually handsome in lf. and fl. Var. **purpùrea,** Hort. (*S. purpùrea*, Hort. *Megásea cordifòlia* var. *purpùrea*, Hort.). Lvs. smooth and coarsely serrate, the panicles larger than the type and carried well above the lvs.: petals broad rounded and deep reddish purple. Var. **rósea,** Hort. (*Megásea cordifòlia* var. *rósea*, Hort.) has been offered.

2. **crassifòlia,** Linn. (*S. cuneifòlia*, Hort., not Linn. *S. sibírica*, Hort., not Linn. *Megásea crassifòlia*, Haw. *Bergènia crassifòlia*, Fritsch). Fig. 3555. Six to 16 in. high, stout: rhizomes woody: lvs. obovate to long-obovate, large and thick, narrowed at the base and decurrent on the petiole, margin serrate to nearly entire, apex obtuse, glabrous, shining: infl. a fairly tall, angled, reddish or purplish scape: fls. deep rose, lilac or purplish, in dense panicles, elevated above the lvs.; calyx-lobes oblong, obtuse; petals elliptic-oblong. March–May. Altai to Mongolia. B.M. 196. G.M. 34:67. Mn. 10, p. 74.—*S. Van Hoùttei*, Hort., is only a variation of this species, with lighter pink fls. Var. **orbiculàris,** Hort. (*S. orbiculàris*, Hort. *Bergènia orbiculàris*, Stein. *Megásea orbiculàris*, Hort.). A small-growing form with broad rather rounded lvs., a branching habit and an abundance of light rosy fls. which are borne well above the foliage.

3555. Saxifraga crassifolia.

3. **purpuráscens,** Hook. f. & Thom. (*Megásea purpuráscens*, Hort. *Bergènia purpuráscens*, Engl.). Three to 12 in. high: lvs. roundish-obovate to short-oblong, 2–3 in. long, base somewhat cordate, margin more or less undulate, glabrous: infl. a scape about 1 ft. high, purple, this and the pedicels very pubescent: fls. deep purple, nodding, in few-fld. corymbose panicles; calyx-lobes very obtuse; petals ¾in. long, obovate-oblong, sometimes long-clawed: fr. elliptic-lanceolate, erect. June. Sikkim (India), 10,000–15,000 ft. B.M. 5066. H.F. II. 1:172. B.H. 9:1. F.S. 14:1401.—A very handsome species because of its purple scapes and fls. and the beautiful purple-and-crimson autumnal foliage. Succeeds best in a rather sheltered spot.

4. **ligulàta,** Wall. (*Megásea ligulàta*, Hort. *Bergènia ligulàta*, Engl.). One foot high, stout: radical lvs. large, orbicular or obovate, 2–12 in. diam., base cordate, margins entire but ciliate, both surfaces glabrous: infl. an erect naked scape, this and the pedicels and calyx glabrous: fls. white, rose or purplish, campanulate in nodding 1-sided racemes; calyx-lobes ovate, not narrowed at base; petals ⅛–1 in. long, orbicular and clawed: fr. subglobose, cernuous. March–May. Himalayan region. B.M. 3046 ("the sepals too acute and the leaves too undulate," according to Hooker). L.B.C. 8:747. R.H. 1868:270. J.H. III. 69:136. Gn. 62, p. 25; 76, p. 204.—Not perfectly hardy at Boston. Sometimes erroneously written *S. lingulata* which is a very different species (No. 67).—*S. ornàta*, Decne. (*Bergènia ornàta*, Stein), is said to have large coriaceous, persistent lvs., fleshy sts., and large rose fls. in cymes. Apparently does not possess any character to distinguish it from *S. ligulata* except the fls. are a shade lighter in color. Var. **ciliàta,** Hook. (*S. ciliàta*, Royle. *S. thysanòdes*, Lindl. *S. Stràcheyi* var. *thysanòdes*, Hort. *Megásea ciliàta*, Haw. *M. ligulàta* var. *ciliàta*, Hort. *Bergènia ciliàta*, Stein). Lvs. hirsute on both surfaces, margins strongly ciliate. B.M. 4915. B.R. 32:33 (as *S. thysanodes*). G.C. III. 5:365. F.E. 16:472. Var. **Leichtlinii,** Hort. (*S. Leichtlinii*, Hort. *Megásea Leichtlinii*, Hort.). Grows about 1 ft. high and has large crimson lvs. and rose-colored fls. Var. **rósea,** Hort., is a form with rose-colored fls. Var. **rùbra,** Hort., is an early-flowering, low form with red or red-purple fls. Var. **speciósa,** Hort. (*S. speciósa*, Hort., not Doerfl. & Hayek. *Megásea speciósa*, Hort.). Lvs. broadly ovate, leathery: fls. crimson or deep rosy crimson. Gn. 71, p. 250. J.H. III. 60:393.—By some this is thought to be a garden hybrid *S. ligulata* × *S. crassifolia*.

5. **Stràcheyi,** Hook. f. & Thom. (*S. unguiculàta*, Hort., not Engl. *Megásea Stràcheyi*, Hort. *Bergènia Stràcheyi*, Stein). Fig. 3556. Six inches to 1 ft. or more high: lvs. obovate, usually not cordate at base, margin subentire, ciliate or crenate-serrate, both surfaces glabrous: infl. a scape about 1 ft. high with the pedicels and calyx pubescent or puberulous: fls. blush-pink to rose (sometimes yellow), in broad branching panicles ¾–1 in. diam.; calyx-lobes oblong. March. Kashmir, 8,000–14,000 ft. B.M. 5967(?). G.M. 39:233. J.H. III. 32:281. G. 12:337.—More hardy than *S. ligulata*. Var. **álba,** Hort. (*S. afghánica*, Aitch. & Hemsl. *S. afghanistánica*, Leicht. *Megásea afghánica*, Hort.). A snowy white-fld. form, the lvs. bronzy or ruby-brown. Gt. 35:1228. G. 31:751. Var. **Milesii,** Hort. (*S. Milesii*, Hort. Leicht. *Bergènia Milesii*, Stein. *Megásea Stràcheyi* var. *Milesii*, Hort.). Differs from the type in having longer lvs. (9–12 x 4–5 in. at the middle): fls. white; petals distinctly clawed. March. Himalaya. Var. **Schmídtii,** Hubb. (*S. thysanòdes*, Hort. Haage & Schmidt, not Lindl. *S. Schmídtii*, Regel. *Bergènia Schmídtii*, Hort.). Lvs. ovate, base equally rotundate or attenuate to the petiole, margin coarsely crenate and then dentate, the teeth cuspidate-ciliate: fls. panicled, similar to those of *S. crassifolia*. Himalaya. Gt. 27:946. B.R. 29:65 (as *S. ciliata*).

Section II. CYMBALARIA.

A. *Lower lvs. 7–11-lobed; the lobes acute*.. 6. **Cymbalaria**
AA. *Lower lvs. 5–7-lobed; the lobes obtuse or very shortly apiculate*..... 7. **Huetiana**

6. **Cymbalària,** Linn. Annual or biennial: sts. nearly erect or somewhat flexuous, branched, 3–12 in. high: lvs. tender, with age brown-striate on both surfaces, margin glandular-pilose; lower lvs. reniform, cordate or truncate at base, 7–11-lobed, lobes broad-acute; upper lvs. short-petioled, 3–7-lobed, base attenuate: infl. cymose with elongated axis; pedicels long, 1-fld., these and the calyx short glandular-pilose: fls. yellow; calyx-lobes oblong, acute; petals oblong, base cordate, distinctly clawed, 3 times the length of the calyx-lobes. May–Aug. Caucasus and Asia Minor.—The lvs. are light green, glossy and ivy-like. It sows itself

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abundantly and is suitable for moist spots in rockwork or along streams. Some, possibly much, of the material cult. as *S. Cymbalaria* is really the closely allied *S. Huetiana.*

7. **Huetiàna,** Boiss., frequently incorrectly offered as *Huettiàna, Hùetii,* and *Huèttii* (*S. Cymbalària,* Hort., not Linn.). Annual or biennial(?): sts. weakly erect or decumbent, flaccid, 4–6 in. high: lvs. soft, with age brown-striate below; lower lvs. reniform-cordate, base cordate or truncate, broader across, 5–7-lobed, lobes broad, obtuse or very shortly apiculate; upper 3-lobed or entire, ovate: infl. cymose with long erect pedicels; fls. small but numerous, bright yellow; calyx-lobes triangular, acute; petals oblong, obtuse, base distinctly clawed, 3 times the length of the calyx-lobes. May–Aug. Asia Minor.—Very closely allied to *S. Cymbalaria* and by some considered a variety of that species. It differs in its dwarfer less upright habit, fewer and more obtuse lobes of the lvs. and other technical floral characters and probably in its infl. being a cincinnus instead of a bostryx. A very effective plant for the rockwork.

Section III. Miscopetalum.

A. *Rhizome rather thick: lvs. unevenly and coarsely crenate or dentate* ..... 8. **rotundifolia**
AA. *Rhizome slender: lvs. 5–9-crenate or shallow-lobed, the lvs. smaller than the last* ..... 9. **taygetea**

8. **rotundifòlia,** Linn. Sts. 8–12 in. high, erect from a somewhat thickened rhizome, leafy and paniculate from the middle or above: lvs. rather thick, more or less hairy on both surfaces; basal and lower on petioles 3–4 times longer than the blades, reniform or orbicular, base cordate, unequally and coarsely crenate or dentate; cauline almost sessile, base obtuse or cuneate, with more or less incise-dentate lobes: infl. a branched panicle with long, slender glandular-hirsute peduncle and pedicels; fls. white, spotted with red or purple; calyx-tube very short, lobes triangular oblong, acute; petals oblong-lanceolate. May, June. Eu. and Asia. B.M. 424.—A very satisfactory species for moist and shady parts of the rockwork. Var. **glandulòsa,** Griseb. (*S. glandulòsa,* Hort. *S. lasiophýlla,* Schott. *S. angulòsa,* Schott. *S. rotundifòlia* var. *angulòsa,* Hort.). Sts. tall, glandular-pubescent: basal lvs. obtusely crenate; the cauline lvs. incise-dentate: the panicle branches spread out and many-fld.

9. **taygétea,** Boiss. & Heldr. (*S. rotundifòlia* var. *taygétea,* Engl.). Sts. 3–6 in. high, erect from a slender rhizome, almost naked, pubescent: lvs. small, firm, sparse hirsute, slightly membranaceous-margined; the radical lvs. long-petioled, subcordate-reniform, broadly and obtusely 5–9-crenate; the cauline lvs. none or 1 or 2 minute ones which are 3-parted or linear: infl. loosely paniculate-corymbose; the branches 1–2-fld.: fls. white with purple dots; calyx-lobes oblong, rather obtuse; petals elliptical-lanceolate, obtuse. June–Aug. Greece.—Much of the material cult. under this name is really *S. cuneifolia.*

Section IV. Tridactylites.

10. **adscéndens,** Linn. (*Muscària adscéndens,* Small). One to 6 in. high, the whole plant viscidulous and clothed with short glandular hairs: sts. erect: the basal lvs. crowded, the cauline few, cuneate, gradually attenuate all the way to the base, the apex rounded or truncate, 3–5-lobed, the lobes subequal, oblong or ovate, rather obtuse or acutish: infl. corymbose, sparingly branched from the middle or base of the fl.-st. branches erect; fls. white; calyx glandular-pilose, tube campanulate, in fr. rounded at the base and twice as long as the lobes; petals cuneate, emarginate, slightly 5-nerved, double as long as the calyx-lobes. June, July. Eu. and in the Rocky Mts., S. Canada to Colo. and Utah.—A very common and widespread European species which has not been frequently cult.

Section V. Nephrophyllum.

A. *Basal lvs. cuneate or spatulate* ..... 11. **lactea**
AA. *Basal lvs. cordate or reniform.*
B. *Infl. corymbose-paniculate* ..... 12. **granulata**
BB. *Infl. racemose, 1–5-fld.* ..... 13. **rivularis**

3556. Saxifraga Stracheyi, as the flowers are appearing in earliest spring. (×¼)

11. **láctea,** Turcz. Cespitose, 4–6 in. high: sts. erect, glandular-pubescent below, paniculate above: lvs. light green, lower cuneate, 3–5-parted, lobes oblong, very obtuse, horizontal-spreading; upper 3-parted, lobes linear, obtuse: infl. axillary, with pedicels much longer than the fls., 2–fld., the terminal fl. exceeded by the lower; fls. white (milky white according to trade-lists); calyx-lobes ovate, obtuse, longer than the tube; petals obovate-cuneate, lightly 3-nerved, 3 times as long as the calyx-lobes. June. Siberia.—Probably not in general cult.

12. **granulàta,** Linn. Meadow Saxifrage. Sts. erect or ascending from a bulbiferous base, 6–20 in. tall, slightly foliose, often branched below, lax paniculate, soft-hirsute, glandular-viscous above: lvs. pilose, bearing bulblets in the axils, reniform, incise-lobed, lobes entire or crenate, decurrent at base on the hirsute petiole; cauline lvs. subsessile, wedge-shaped, 3–5-parted: infl. open, panicled, with glandulose elongated pedicels (sometimes contracted and umbel-like): fls. white, campanulate, somewhat drooping, about 1 in. diam.; calyx-lobes longer than the ovate tube, linear-oblong, obtuse; petals obovate-oblong, strongly attenuate at base, 3-nerved. April–June. Eu., N. Afr. Gn.W. 25:513.—The common meadow saxifrage of Eu. and an attractive plant. The species proper is, however, seldom cult. Var. **flòre-plèno,** Hort. (*S. granulàta* var. *plèna,* Hort.), is the common form in cult. and differs only in its double fls. G. 25:201; 26:213. Gn.W. 23:389.

13. **rivulàris,** Linn. Cespitose, the sts. ascending 1–3 in. high, more or less villous: basal lvs. with petioles 3–5 times longer than the blades, reniform, palmately 3–7-lobed, lobes obtuse, petioles with broad ciliate stipules; upper lvs. short-petioled, 3-lobed: infl. long, peduncles arising from the axils of the lower lvs., almost as long as the whole st.; fls. at the top short-pedicelled or sessile: fls. 1–5, white (often tinged purple), erect; calyx short-glandular pilose or rather glabrous, tube hemispherical, lobes ovate, obtuse, shorter than the tube; petals obovate-oblong, twice as long as the calyx-lobes. July, Aug. Circumboreal, in N. Amer. to the White Mts. and in the Rocky Mts. to Mont.

Section VI. Dactyloides (Muscaria).

A. *Lower lvs. undivided or short 3–5-pointed: petals mostly small (see also S. moschata and S. globulifera, which have some of the lvs. undivided).*
B. *Plants loosely cespitose, with indeterminate secondary shoots borne in the lf.-axils.*

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SAXIFRAGA

CC. *Infl. a few-fld. panicle borne on a fl.-st. 2–4 in. high*.....14. **tenella**
CC. *Infl. 1-, rarely 2-fld., borne on a fl.-st. about 1 in. high*.....15. **aphylla**
BB. *Plants densely cespitose: scape 1-fld. or few-fld., paniculate*.....
C. *Axils of the lvs. of the secondary shoots with buds of undeveloped cataphylla.*
D. *Calyx-lobes mucronate*.....26. **conifera**
DD. *Calyx-lobes obtuse*.....28. **spathulata**
CC. *Axils of the lvs. of the secondary shoots without buds of undeveloped cataphylla.*
D. *Lvs. linear*.....16. **muscoides**
DD. *Lvs. spatulate*.....17. **androsacea**
AA. *Lower lvs. more or less digitately lobed or divided (entire in Nos. 26 and 28): petals longer and broader than calyx-lobes.*
B. *Secondary shoots indeterminate: the infl. borne in the axils of the lower lvs.*
C. *The lvs. glandular-pilose, orbiculate-digitate: fls.-sts. 3–6 in. high*.18. **ajugifolia**
CC. *The lvs. not glandular, wedge-shaped: fl.-sts. 1½–3 in. high*..19. **perdurans**
BB. *Secondary shoots determinate, ending in an infl.*
C. *Petals obovate-cuneate, attenuate-clawed.*
D. *Blades of the almost sessile lvs. oblong-cuneate*.....25. **pedemontana**
DD. *Blades of the petiolate lvs. ovate or orbicular.*
E. *Divisions of the suborbicular or reniform lvs. lanceolate*..20. **geranioides**
EE. *Divisions of the ovate lvs. linear*.....21. **pedatifida**
CC. *Petals obovate, obovate-oblong or oblong, not attenuate clawed.*
D. *Plants loosely cespitose, frutescent, the rosettes of rigid lvs. of this year far removed from those of the previous year.*
E. *Lvs. cuneately attenuate to the petiole; the lobes horizontally spreading.*
F. *Lower lvs. incise 3-lobed; the midlobe usually entire*.....22. **Camposii**
FF. *Lower lvs. pedately divided; the midlobe 3-parted*.....34. **obscura**
EE. *Lvs. trifurcate, bowed-attenuate to the petiole; the lobes divaricate.*
F. *Petiole deeply grooved; the midlobe of lf. entire*.....23. **canaliculata**
FF. *Petiole not deeply grooved: the midlobe of lf. 3-toothed*.....24. **trifurcata**
DD. *Plants densely cespitose, the rosettes of lvs. of this year close to those of the previous year (specimens of S. decipiens excepted).*
E. *Axils of the lvs. of the secondary shoots without buds of undeveloped cataphylla.*
F. *Petals oblong, equaling or rarely exceeding the calyx-lobes in width*.....36. **moschata**
FF. *Petals obovate or obovate-oblong, exceeding the calyx-lobes in width.*
G. *Nerves of the lvs. usually prominent.*
H. *Blades of lvs. sessile or short-petioled; the midlobe oblong*....33. **exarata**
HH. *Blades of lvs. with petioles as long as the blades: the midlobe linear*.....35. **mixta**
GG. *Nerves of the lvs. not at all prominent.*
H. *Divisions of the lvs. more or less acute*....31. **decipiens**
HH. *Divisions of the lvs. more or less obtuse*..32. **cespitosa**
EE. *Axils of the lvs. of the secondary shoots with buds of undeveloped cataphylla.*
F. *Calyx-lobes mucronate.*
G. *Lvs. undivided and sessile*.....26. **conifera**
GG. *Lvs. 3-lobed and petioled*.27. **hypnoides**
FF. *Calyx-lobes obtuse.*
G. *The lvs. all undivided*...28. **spathulata**
GG. *The lvs. (the lowest excepted) lobed.*
H *Calyx-lobes ovate-triangular, about equaling the length of the tube*.....29. **globulifera**
HH. *Calyx-lobes ligulate-lanceolate, twice the length of the tube*...30. **Maweana**

Subsection HOLOPHYLLÆ.

14. **tenélla,** Wulf. Lax, cespitose, 2–4 in. high, with foliose, prostrate or erect caudicles: sts. erect, slender, glabrous: lvs. yellow- or apple-green, shining, thin but rather stiff, lower and also cauline, linear-subulate, cuspidate-aristate, margin setulose-ciliate or glabrous, glandulose-ciliate toward the base: infl. terminal, few-fld. panicles with slender pedicels longer than the fls.: fls. white or yellowish white; calyx-lobes triangular, acute, equaling the tube, glabrous; petals obovate-oblong, recurved above, 3-nerved, twice as long as the calyx-lobes. June, July. Mountains of Cent. Eu.

15. **aphýlla,** Sternb. (*S. leptophýlla*, Froel.). Loosely cespitose, about 1 in. high with numerous sparsely foliate caudicles with rosettes at the top: sts. sparsely glandular-pilose: lvs. light green, rather thin, entire or 3–5-cuspidate, the divisions ovate-lanceolate, obtuse: infl. almost leafless 1-fld., rarely 2-fld. glandular scapes: fls. light yellow; calyx-lobes ovate, acute; petals linear, acute, equaling the calyx-lobes. June, July. Mountains of Eu.

16. **muscoìdes,** All. Densely cespitose, 1–2 in. high, with short caudicles: sts. columnar, densely imbricate-foliose, ashy pilose: lvs. linear, rounded-obtuse, base attenuate, when dried 3-nerved, apex cinerous: infl. numerous, terminal, few-fld. racemes or more seldom several-fld. panicles with very short pedicels: fls. white or yellowish white (rarely citron-yellow or purple); calyx-lobes ovate, obtuse; petals round-obovate, very obtuse, smoothly emarginate, 3-nerved, twice as long as the calyx-lobes. July, Aug. High mountains from the Pyrenees to Austria. Gn. 76, p. 615.—Frequently confused with *S. moschata* and *S. cespitosa*. A strictly Alpine species forming a dense moss-like cushion, the uppermost lvs. of which are reddish toward the base and fresh green toward the apex and are rather fleshy. Suitable only for alpine-gardening. Var. **fòliis-variegàtis,** Hort., is a form with yellow-and-white variegated lvs. Very likely this really is a variety of *S. moschata*.

17. **androsàcea,** Linn. Cespitose, 1–3 in. high (possibly more), with the basal and lower lvs. aggregated and sessile: lvs. dark green, shiny, spatulate or obovate, cuneate, apex entire or 3–5-toothed, the teeth short and acute, the central twice longer than the lateral, when dry 5–11-nerved, margin ciliate, at the top glandulose-ciliate; cauline lvs. oblong-lanceolate: infl. numerous, almost naked, sparsely glandular, 1–3-fld., rarely 5-fld. scapes: fls. small, clear white or greenish white; calyx-lobes ovate, obtuse, the base and margins glandular; petals obovate-oblong, 3-nerved, at the top emarginate, the uppermost portion reflexed, twice longer and broader than the calyx-lobes. June–Aug. Mountains of S. and Cent. Eu., also the Baikal region of Asia.

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Subsection AXILLIFLORÆ.

18. **ajugifòlia,** Linn., also spelled *ajugæfolia*. Cespitose, about 3–6 in. high: st. decumbent, rooting: lvs. sparsely glandular-pilose, light green, rather thick and fleshy, orbiculate-digitate, 3–5-parted, attenuate to the flat petiole, lobes lanceolate, acute: infl. 1–5 slender, nearly simple, few-fld. scapes arising from the axils of the lower lvs.; bracts linear, entire, acute; pedicels very short, puberulent: fls. rather small, whitish or clear milk-white; calyx-lobes ovate, acute; petals ovate-oblong, 3-nerved, very shortly clawed, twice longer than the calyx-lobes. May–July. S. Eu.

19. **perdùrans,** Kit. Cespitose, 1½–3 in. high: sts. procumbent: lvs. rather thick, bright green, the lower surface striped purple at the nerves, those of the young shoots and the lower cauline similar, without glands, wedge-shaped, attenuate to the flat petiole, palmately 3–5-parted, lobes horizontal spreading, oblong, obtuse, muticous, faintly 3-nerved: infl. a solitary, axillary, subsimple, few-fld. scape with a reddish base and one partially clasping lf.; bracts 3-parted or entire: fls. 1–5, cymose, white; calyx-lobes roundish; petals spreading, oblong, 3-nerved, more than twice as long as the calyx-lobes. June, July. Mountains of E. Cent. Eu.—Closely allied to *S. ajugifolia*.

Subsection CERATOPHYLLÆ.

20. **geranioides,** Linn. (*S. palmàta*, Hort., not Smith and others). Biennial or perennial, cespitose, 2–10 in. high, with numerous frutescent subwoody, leafy caudicles: sts. erect, somewhat pilose: lvs. bright green, lower rather pilose, suborbicular or reniform, palmately 3-divided with the lateral lobes bifid, lobes lanceolate-acute or 2–3-toothed, base of the ciliate petiole dilate; cauline lvs. cuneate-ovate with narrow lobes: infl. subcorymbose, many-fld., with pedicels shorter than the fls.: fls. white, campanulate; calyx-lobes erect, linear-lanceolate, acute; petals obovate-oblong, long-clawed, more than twice longer than the calyx-lobes. May–July. Mountains of Eu.—Best prop. by seed. A showy little ground-cover plant suitable for terraces and the like.

21. **pedatifida,** Ehrh. (*S. cuspidàta*, Schleich.). Cespitose, 2–8 in. high, with frutescent, subwoody, leafy caulicles: sts. erect, rather stiff, puberulent: lvs. fresh green, the lower with ovate and pedate-parted blades, many-nerved and borne on flat petioles which are longer than the blades, the lateral lobes of which are 3-lobed, the lobules linear, entire and more or less mucronate; the lvs. of the young shoots longer-petioled and with longer, narrower lobes; the cauline lvs. 3–5-lobed; bracts narrowly linear: infl. subcorymbose, the peduncles much overtopping the lvs., the pedicels and calyx glandular-pilose: fls. 3–9 on a peduncle, campanulate, white; calyx-lobes erect, lanceolate, acute; petals obovate-oblong, 5–7-nerved, long-clawed, 2 or 3 times longer than the calyx-lobes. June. S. Eu.—Closely allied to *S. geranioides* but distinguished readily by the gradual narrowing of the blades, which are many-nerved into the petiole and also by the linear divisions of the lvs.

3557. Saxifraga Camposii.

22. **Campòsii,** Boiss. & Reut. (*S. Wàllacei*, McNab. *S. Wallacedna*, Hort.). Fig. 3557. Perennial, loosely cespitose, 3–6 in. high, with slightly shrubby caudicles covered with old retroflex lvs.: fl.-sts. erect, reddish, entirely glabrous: lvs. stiff, dark green, shiny, those of the young shoots and the lower ones incise-3-lobed, more than double the length of the strongly broadened, nerved petiole and having decidedly prominent nerves, the lateral lobes of the blade again 2-lobed or dentate with the teeth mucronulate, the midlobe usually entire, linear and mucronate; cauline lvs. cuneate, attenuate to the petiole, more obtusely dentate; bracts spatulate, acute: infl. terminal, 6–10-fld., more or less congested corymbs or panicles: fls. large, ¾in. across, subcampanulate, white; calyx-lobes oblong, acute; petals rounded-obovate, shortly clawed, 3-nerved. May–July. Spain. B.M. 6640. Gn. 35, p. 392; 75, p. 335. A.F. 4:493. G.M. 43:192; 55:276; 57:620. J.H. III. 70:250.—This species has been intro. into Amer. but never succeeded well owing, it is said, to the hot climate. An attractive little plant on account of its showy fls. which are occasionally used for cut-fls.

23. **canaliculàta,** Boiss. & Reut. Lax, cespitose, 6–8 in. high, with ascending caudicles which are covered below with old, rather remote lvs., and terminate in rosettes: fl.-sts. numerous, erect, very glabrous: lvs. very stiff, quite dark green, strongly viscid below, with transversely broader blade which is 3-parted and is borne on a flat, deeply grooved petiole, midlobe of the blade entire, the lateral ones 2–3-parted, with the lobes bowed and mucronate at their apex; cauline lvs. 3-parted; bracts linear, mucronate: infl. corymbose-paniculate: fls. white; calyx-lobes linear-lanceolate, mucronulate; petals obovate-oblong, attenuate to the claw, 3-nerved, twice as long as the calyx-lobes. July. Spain.—Allied to *S. Camposii* from which it differs in the more spreading divisions of the lvs. and the fact that the petioles are not broadened except at the base.

24. **trifurcàta,** Schrad. Perennial, loosely cespitose, 4–8 in. high, with slightly shrubby leafy caudicles covered with old reflexed lvs.: fl.-sts. erect, glabrous: lvs. dark gray-green, viscid, twice as long as the petioles, palmately 3-parted, nerved, the lateral lobes of the blade sub-3-divided, the midlobe cuneate, 3-toothed, with the teeth mucronulate; cauline lvs. few, shorter-petioled, 3-parted; bracts linear, acute: infl. loosely paniculate; pedicels long: fls. milk-white, numerous; calyx glabrous, the lobes lanceolate, acute; petals obovate-oblong, 3-nerved, nearly 3 times the length of the calyx-lobes: fr. ovate. May. Spain. G.C. III. 48:295. F.E. 18:442.—A quick grower, which is frequently cult. abroad and which is also useful for pot cult. Var. **ceratophýlla,** Hort. (*S. ceratophýlla*, Dry.). Lvs. rigid and more deeply parted than the type and rather glaucous: fls. white, in lax panicles. June. Spain. B.M. 1651.

25. **pedemontàna,** All. Sparsely glandular-pubescent, cespitose, 2–4 in. high, with densely leafy caudicles: lvs. bright green, those of the young shoots and the lower cauline, cuneate or obversely triangular, attenuate to the flat ciliate petiole which equals or is shorter than the 3-lobed blade, lobes horizontally spreading, the lateral ones bifid or all 3 incise-dentate, teeth obtuse or rather acute, obsoletely nerved; lower bracts cuneate, sessile, 5–7-parted or linear-oblong, obtuse: infl. few-lvd., rather glabrous scapes bearing corymbose panicles with slender pedicels which are glandular-pubescent as is the calyx: fls. large, campanulate, milk-white; calyx-lobes linear, obtuse; petals obovate-cuneate, attenuate to a claw, 3-nerved, double the length of the calyx-lobes. July. Mountains of S. Eu. Gn. 78, p. 271. Var. **cervicórnis,** Engl. (*S. cervicórnis*, Viv.). Younger lvs. longer-petioled, the blade 3-lobed; the lateral lobes bifid, less horizontally spreading, rather acute, the nerves decidedly prominent: the calyx-lobes rather acute. June. Sardinia and Corsica. Gn. 76, p. 19; 79, p. 29.

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Subsection GEMMIFERÆ.

26. **conífera,** Coss. & Dur. Densely cespitose, ½–3 in. high, with numerous short, densely imbricate-foliose caudicles: fl.-sts. stiff, ascending, few-lvd., purple below, densely glandular-pubescent above: lvs., those of the caudicles, subpatent; cauline erect-spreading; all of them undivided, sessile, oblong- or lanceolate-linear, cuspidate-aristate, leathery, margin short-ciliate: infl. 3–9-fld., corymbose-racemose or paniculate: fls. white; calyx pubescent-glandular, the lobes ovate-triangular, mucronate; petals not known. June, July. Spain.—Rare and seldom cult.

27. **hypnoïdes,** Linn. (*S. hibérnica*, Hort.). Perennial, loosely cespitose, 1½–8 in. high, with herbaceous loosely foliose caudicles which are frequently reddish tinted: sts. erect, covered with very slender glands: lvs. light green, those of the caudicles rather thick, sparsely covered with slender hairs, when old rather glabrous, the suborbicular blade is cut all the way to the base, 3-lobed, and is borne on a rather broad, flat, 1-nerved, ciliate petiole which is shorter than the blade, lobes of the blade linear-lanceolate, a little dilated at the middle, acute or mucronate, with the lateral lobes divaricate, often 2-lobed; upper lvs. of the young shoots 3-toothed, attenuate to the long petiole, the uppermost linear-lanceolate; cauline lvs. few and like the bracts linear-lanceolate, ciliate and acute or mucronate: infl. 3–7-fld. panicles: fls. long-pedicelled, white, ⅓–1 in. diam.; calyx very densely glandulose, the lobes oblong-triangular, mucronulate; petals obovate, 3-nerved, twice longer than calyx-lobes: fr. ovate-globose. May–July. Mountains of Eu. as far north as Great Britain and Ireland. G.C. III. 43:302.—Frequently confused with *S. cespitosa*, Linn., and *S. decipiens*, Ehrh., and the varieties of the 3 species are almost hopelessly confused. Botanically speaking very probably Hooker in his Students' Flora of the British Islands, ed. 3, p. 142, is correct in referring *S. cespitosa* and *S. decipiens* as varieties to this species, but horticulturally at least they are better retained as separate species. Var. **gemmífera,** Hort. (*S. Kíngii*, Hort., also spelled *Kingiàna*), is a close-growing, compact form. Var **purpûrea,** Hort., is offered in the trade. Var. **rôsea,** Hort., is offered in the trade. Var. **Whitlàvii,** Hort. (*S. Whitlàvii*, Hort.), is a form with closely packed foliage said to be suitable for edging. A variation of this is offered as *S. Whitlàvii compácta.*

28. **spathulàta,** Desf., also spelled *spatulata.* Perennial, very densely cespitose, 2½–4 in. high, with short, prostrate, very densely imbricate-foliose caudicles: sts. slender, erect, few-lvd.: lower lvs. spatulate, ciliate, apex obtuse, rarely 3-toothed, 3-nerved; cauline linear: infl. 3–5-fld. corymbose panicles with pedicels longer than the fls. and sparsely glandular as is the calyx: fls. white; calyx-lobes ovate, very obtuse; petals obovate-oblong, twice as long as the calyx-lobes: fr. subglobose. June. N. Afr.—It is doubtful whether this species is hardy in E. U. S. It forms very thick, close mats which are reddish green or brownish with the silver-gray buds of the shoots dotted through. Not very showy, as the panicles are few-fld.

29. **globulífera,** Desf. Cespitose, about 3–4 in. high, with densely foliose, short caudicles: sts. prostrate, nearly glabrous or sparsely pilose, few-lvd.: lvs. bearing in their axils buds which are shorter than the lvs.; lvs. all nerved and borne on dilated rather flat petioles; the lowest spatulate-cuneate, entire; the others 3-lobed or, if the lateral lobes are bifid, 5-lobed, the midlobe oblong-lanceolate or, if all the lobes are tridentate, with the teeth rather acute; cauline lvs. oblong-linear, obtuse; bracts linear, obtuse: infl. 3–7-fld., subcorymbose-panicled; pedicels twice or more longer than the fls.: fls. white; calyx short-pilose, the lobes ovate-triangular, obtuse; petals obovate, 3-nerved, more than twice the length of the calyx-lobes: fr. subglobose. May, June. S. Spain and N. Afr.

30. **Maweàna,** Baker. Cespitose, about 6 in. high, with copiously branched, slender purple caudicles which are glandular-pubescent: fl.-sts. erect from a decumbent base: lvs. 6–8 to a shoot, loosely disposed, cordate-reniform, ternate-palmately-parted, the lobes with 3–5 oblong, subobtuse teeth; the petioles spreading, the upper half narrowly winged, often 2–3 times longer than the blade: axillary buds copious and robust: infl. laxly corymbose, 4–9-fld., borne on densely puberulent peduncles: fls. white, large; calyx-lobes ligulate-lanceolate, subobtuse, twice as long as the densely puberulent tube; petals obovate-cuneate. May. Morocco. G.C. 1871:1355.

Subsection CESPITOSÆ.

31. **decípiens,** Ehrh. (*S. cæspitòsa*, Hort., not Linn.). Cespitose, about 3 in. high, the caudicles herbaceous, rarely subligneous, rather long and leafy: sts. erect, few-lvd., smooth or at first glandular-pilose above: lvs. obovate-cuneate or spatulate, attenuate to the 1-nerved, flat petiole, apex either 3-pointed or 3-lobed, lateral lobes 2- or 3-lobed or even the midlobe 3-lobed, the lobes oblong acute; cauline lvs. deeply 3-lobed: infl. loosely panicled, few-fld. (usually 3): fls. white; sepals oblong-lanceolate, subacute; petals obovate, 3-veined. May, June. Eu. L.B.C. 16:1510. Gn. 78, p. 271.—Approaches *S. cespitosa*, Linn., from which it is most easily distinguished by the acute lf.-lobes and subacute sepals; also approaches *S. hypnoides*, from which it is readily told as that species has buds in the axils of the lvs. of the barren shoots, whereas *S. decipiens* has not. Very variable; some of the cult. forms are: Var. **álba,** Hort., which has strong growth and white fls. Var. **Árkwrightii,** Hort. (*S. Árkwrightii*, Hort.). Rather tall-growing and free-flowering: the buds are suffused with a pale rose tint, but the fls. are pure white, flat, and large, ¾–1 in. across. G.C. III. 45:314. Var. **bathoniénsis,** Hort. (*S. bathoniénsis*, Hort. *S. muscoïdes* var. *bathoniénsis*, Hort.). A rapid grower, 10–14 in. high, with stout branching sts. bearing large scarlet-crimson fls. Var. **bristoleàna,** Hort. Fls. bright crimson. Var. **Clíbranii,** Hort. (*S. Clíbranii*, Hort. *S. muscoïdes* var. *Clíbranii*, Hort.). A plant of robust constitution, increasing rapidly and flowering freely; the foliage consisting of closely set rosettes of grass-green color: fl.-sts. 5–6 in. high, bearing fls. which are variously described as deep clear rose, rich crimson and rich blackish crimson, ½in. or more diam. G.C. III. 45:301. G. 36:395. Gn. 73, p. 264. J.H. III. 58:431. Var. **grandiflôra,** Hort., is a free-growing plant 6–8 in. high with good-sized fls. of a rich red fading to pink. Very similar to var. *bathoniensis*. Var. **grœnlándica,** Engl. (*S. cespitòsa* var. *grœnlándica*, Hort.). Densely cespitose, with few-lvd., few-fld. sts. and broadly cuneate, palmately 3–5-divided lvs.; the lobes ovate-lanceolate, acute. Ireland, Scotland, Wales, Norway, Iceland, Greenland, and Lab.

Var. **hýbrida,** Hort., is probably a strain of red-fld. hybrids. It is suggested by one author that they are the result of a cross between *S. decipiens* and *S. granulata*. Some of the trade names of these variants are *S. decípiens hýbrida grandiflòra*, Hort. (*S. decípiens grandiflòra hýbrida*, Hort. *S. hýbrida grandiflòra*, Hort.), with large rich crimson or bright red fls. *S. hýbrida grandiflòra álba*, Hort., with neat cushions of dark green foliage and large pure white fls. resembling those of *S. Burseriana* var. *gloria*. *S. rôsea supérba*, Hort., which is said to be a remarkably effective variety with rich rose-red fls. G.M. 56:151. *S. hýbrida spléndens*, Hort., with rosettes of moss-like foliage covered with medium-sized brilliant red or dark carmine-red fls. All of these forms are much prized by fanciers abroad.

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Var. **lutéscens,** Hort., is offered in the trade. Var. **purpûrea grandiflòra,** Hort., is a trade name for a form which is said to be more vigorous than previous red saxifrages. It is said to form compact basal tufts with bright red fls., fading to rose, nearly 1 in. diam. April. Var. **sanguínea,** Hort. (*S. sanguínea supérba,* Hort., not *S. sanguínea,* Franch. *S. muscoìdes* var. *sanguínea supérba,* Hort.). Habit neat and compact, growth rapid: fls. rich blood-red, well retained when old. Var. **Stérnbergii,** Engl. (*S. Stérnbergii,* Willd. *S. hibérnica,* Haw., not Sternb. *S. hypnoìdes* var. *Stérnbergii,* Hort.). Lvs. ciliate, somewhat pedate; the midlobe entire, the lateral 2-parted, or the midlobe and also the lateral 3-parted; the divisions rather obtuse. Germany, Ireland, Norway, and Greenland. Var. **villòsa,** Engl., is a form which is villous and canescent and has white fls.

32. **cespitòsa,** Linn., more commonly spelled *cæspitosa* (*Muscària cæspitòsa,* Haw.). Cespitose, 2–6 in. high, a robust grower with short, more or less densely foliose caudicles: sts. few, few-lvd., densely glandular above: lvs. of the caudicles deep green, smooth, nearly glabrous, either cuneate, attenuate to the petiole, the apex 3-toothed, or obovate-cuneate, attenuate to a petiole double the length of the blade, 3-parted (rarely 5), the lobes linear and obtuse: infl. terminal, 1–5-fld.; fl.-sts. stoutish: fls. white; sepals oblong-deltoid, obtuse; petals narrowly obovate or oblong-obovate, rounded at the apex. June–Aug. N. Eu., N. Asia, and N. Amer., Greenland, and Lab., the Rocky Mts. of N. U. S. and Canada to the Pacific coast, south there to Wash. and Ore. Gn. 76, p. 283.—Probably the true *S. cespitosa* is rare in cult. Var. **hírta,** Hort. (*S. hypnoìdes* var. *hírta,* Hort.). A distinct form with very hairy lvs. giving it quite a white, woolly appearance. Var. **incurvifòlia,** Groves (*S. incurvifòlia,* D. Don), has the cauline lvs. more numerous with incurved lobes. Mountains of Scotland, Wales, and Ireland.

3558. A group of saxifragas in a rock-garden. Left, S. Sibthorpii (see supplementary list, page 3105); center, S. altissima (No. 72); right, S. exarata (No. 33).

Subsection EXARATÆ.

33. **exaràta,** Vill. Fig. 3558. Cespitose, 3–6 in. high, with subligneous and also herbaceous caudicles which are rosulate at their tips: fl.-sts. erect, few-lvd., soft hirsute below, mixed with slender glandular hairs above: lvs. of the caudicles cuneate, sessile or petiolate, 3-lobed, the midlobe oblong-obtuse, the lateral either undivided or 2-parted, rather acute; lvs. of the young shoots 3-divided or lanceolate undivided; cauline lvs. 3-parted; bracts lanceolate: infl. paniculate, 4–10-fld.; the pedicels and calyx short-glandular: fls. usually white or yeliowish white but sometimes rose or purple; calyx-lobes obtuse or subacute; petals obovate or obovate-oblong, 3-nerved, double the length of the calyx-lobes. June, July. Alpine regions of Eu., Pyrenees to Greece. G.M. 54:555.—A variable species not commonly cult.

34. **obscûra,** Gren. & Godr. Cespitose, 3–8 in. high, with somewhat shrubby, elongated caudicles covered with old lvs.: fl.-sts. erect, slender, nearly naked, pilose: lvs., those of the shoots and the lower, pedate-divided, with lanceolate lobes, linear, long-petioled, broadened at base, lateral lobes bifid or 2-toothed, teeth lanceolate, the midlobe 3-parted; cauline lvs. 3–5-parted: infl. 5–15-fld., with pedicels shorter than the fls.: fls. white; calyx-lobes linear, subacute; petals oblong, not at all clawed, double the length of the calyx-lobes. July, Aug. Pyrenees.—A rare, little-known species.

35. **míxta,** Lapeyr. The whole plant glandular-pilose, densely cespitose, 2–3 in. high, with subwoody columnar caudicles which are densely imbricate with persistent old lvs.: fl.-sts. erect: lvs. mostly light green, soft and more or less strongly nerved, those of the caudicles and shoots cuneate, borne on a large petiole which equals the blade in length, 3-lobed, the lobes horizontally spreading, obtuse or at other times the lobes 3-lobed, the lobules linear, obtuse; cauline lvs. obovate-cuneate, 3-lobed; bracts oblong, obtuse: infl. corymbose-paniculate: fls. milk-white, not uncommonly purple-nerved; calyx-lobes ovate, obtuse; petals round-ovate, 3 times as long as the calyx-lobes. June–Aug. Pyrenees.—Said to be an attractive little plant with a good habit, but the species proper appears not to have been cult. Var. **Iratiàna,** Engl. (*S. Iratiàna,* F. Schultz). About 2 in. high, differing from the type in the deep green, broadly obovate-cuneate lvs. which are 5–9-divided, the lobes being linear, short, and obtuse; in the few-fld., narrow panicle and also in having the white fls. veined with purple. May–July. Pyrenees.—The variety is more common in cult.

Subsection MOSCHATÆ.

36. **moschàta,** Wulf. (*S. muscoìdes,* Hort., not All. *S. muscoìdes* var. *moschàta,* Hort.). Cespitose, 1–5 in. high, the caudicles herbaceous or subligneous, foliose: lvs. smooth, nerves not prominent, glabrous or glandular-pilose; those of the caudicles linear, entire, obtuse or cuneate, 3-, rarely 5-parted, lobes linear, obtuse, horizontally spreading; cauline lvs. few, 3-lobed or entire; bracts linear, obtuse: infl. racemose or paniculate, 1–10-fld., borne on erect, few-lvd., subglabrous or glandular-pilose fl.-sts.: fls. commonly yellowish but not uncommonly rose or dark purple, seldom almost white; calyx-lobes ovate, obtuse; petals spreading, oblong, obtuse, 3-nerved, slightly exceeding the calyx-lobes: fr. ovate-globose. May, June. Cent. and S. Eu. Gn. 76, p. 283 (as *S. cespitosa*).—Linnæus included this under *S. cespitosa* and in consequence the two species have been commonly confused. There seems no doubt, however, that Linnæus intended his *cespitosa* to apply to the Lapland form. *S. moschata* is readily separated from the true *S. muscoides* by the lobed lvs.; those of the latter are unlobed and linear. A very variable species; some of the varieties in cult. are: Var. **Alliònii,** Engl. (*S. Alliònii,* Gaud., not Baumg. *S. muscoìdes* var.

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Allìonii, Hort.). Laxly cespitose, robust, 3–6 in. high: lvs. long-petioled, 3–5-lobed at the apex; the lobes short and very obtuse: infl. many-fld., paniculate: fls. white; petals broader and obovate. Switzerland. Var. **atropurpûrea,** Sternb. (*S. atropurpùrea*, Sternb. *S. muscoìdes* var. *atropurpùrea*, Ser. *S. muscoìdes* var. *purpùrea*, Sternb.), has the petals dark purple and sometimes obovate-oblong. G.W. 5, p. 254. G.M. 58:1. Var. **compácta,** Correv. (*S. muscoìdes* var. *compácta*, Koch). Tufts small and very dense: lvs. densely imbricate: sts. usually 1-fld., often scarcely ½in. high. Var. **dénsa,** Hubb. (*S. muscoìdes* var. *dénsa*, Hort. *S. dénsa*, Hort., not Willd.), has the foliage so tightly packed as to give the effect of turf: fls. white. Var. **Férgusonii,** Hubb. (*S. Férgusonii*, Hort.). Free-flowering, so much so as nearly to hide the vivid green carpet of foliage: fls. bright crimson, in clusters on very short sts. "Guildford Seedling," also treated as a form of *S. muscoides* and *S. Rhei*, appears to be nothing more than a later-flowering form of var. *Fergusonii*. Gn.W. 23:427. Var. **pygmæa,** Engl. (*S. pygmæa*, Haw. *S. muscoìdes* var. *pygmæa*, Hort.). Densely cespitose: the lvs. rather thick, all entire, the apex rotund-obtuse or with three crenatures. Var. **Rhèi,** Hort., also spelled *Rhæi* and *Rhœi* (*S. Rhèi*, Schott. *S. cespitòsa* var. *Rhèi*, Hort. *S. muscoìdes* var. *Rhèi*, Hort.). Forms mossy hillocks covered in April and May with masses of rather large rose-colored fls. Grows about 6 in. high. A form of this more commonly cult., is known as *S. Rhèi supérba* or *S. muscoìdes Rhèi supérba*, and has a more robust habit and larger deeper colored fls.

Section VII. Boraphila (Spathularia, Micranthes).

A. *Petals lanceolate, clawed, usually somewhat unlike.*
B. *Infl. without bulblets: fls. numerous.* 37. **leucanthemifòlia**
BB. *Infl. with bulblets: fl. solitary at the end of the main st.* 38. **bryophora**
AA. *Petals obovate or obovate-rotundate, about alike.*
B. *Lvs. more or less spatulate, ovate, or obovate.*
C. *The lvs. thin and herbaceous.*
D. *Lf.-blades about as broad as long.*
E. *Infl. many-fld., corymbose-paniculate: sepals not reflexed.* 39. **davurica**
EE. *Infl. few-fld., loosely paniculate: sepals reflexed.* 40. **Lyallii**
DD. *Lf.-blades elongated.* 41. **micranthidifòlia**
CC. *The lvs. thick, leathery.*
D. *Blades of lvs. elongated or elongate-cuneate.*
E. *Margins of the oblanceolate or oblong-spatulate lvs. remotely short-dentate: petals oblong-linear or linear-lanceolate.* 42. **pennsylvanica**
EE. *Margins of the ovate-oblong lvs. entire or slightly sinuate-crenate: petals obovate.* 43. **integrifolia**
DD. *Blades of lvs. ovate or obovate.*
E. *Cymules compact or closely corymb-like at maturity: lvs. roundish ovate.* 44. **nivalis**
EE. *Cymules open and often raceme-like at maturity: lvs. ovate, obovate or spatulate.* 45. **virginiensis**
BB. *Lvs. reniform or suborbicular.*
C. *Bulblets lacking in the axils of the basal lvs.* 46. **punctata**
CC. *Bulblets present in the axils of the basal lvs.* 47. **Mertensiana**

37. **leucanthemifòlia,** Michx. (*S. Michaùxii*, Brit. *Spatulària petiolàris*, Small). Five to 15 or more in. high, caudicles short: lvs. short-pilose on both sides, the basal fleshy, bright green, long-spatulate, cuneate-attenuate to the margined petiole, coarsely dentate, the teeth equal and acute; lower bracts linear-lanceolate, narrowly dentate, upper ones nearly entire: infl. 1 or more scapes arising from the axils of the basal lvs. and branching paniculate from the middle, with the branches more or less diffuse; pedicels slender: fls. white, numerous and star-like; sepals lanceolate; petals unequal, the 3 larger ones with 2 light yellow spots at their cordate base, twice as long as the sepals: fr. ovate. June. Mountains of Va. to N. C. and Ga. L.B.C. 16:1568. B.M. 2959. B.B. 2:176; (ed. 2) 2:221 (as *Hydatica petiolaris*).

38. **bryóphora,** Gray (*Spatulària bryóphora*, Small). Two to 8 in. high, slender: lvs. 1 in. or less long, basal rather far apart, rosulate at the top of the slender caudicles, oblong-elliptic to oblanceolate, obtuse, entire, ciliate: infl. solitary or tufted naked scapes, paniculately branched, the branches erect-spreading, 1-fld. at the end of the main st.; pedicels drooping: fls. white; sepals oblong to ovate; petals unequal, the 3 upper ovate with 2 spots at their cordate base, the 2 lower ovate, with abruptly narrowed base. Sierra Nevada Mts., Calif.—At one time offered by dealers in native plants.

39. **davùrica,** Pall., also spelled *dahurica* (*Micránthes davùrica*, Small). Three to 8 in. high: rhizome thick: lvs. basal, rather stiff, forming a rosette, sparsely covered with very short hairs, obovate-cuneate, rounded at the apex, deeply and evenly dentate, teeth ovate, acute, blades cuneate-attenuate at the base to the petiole which is membranaceous sheathing at its base; bracts oblong-lanceolate, the lowest of them oblong-cuneate: infl. erect naked scapes, which are solitary or several together, and are covered with very slender canescent, partly glandular hairs, many-fld. and corymbose-paniculate branched from the middle; pedicels filiform: fls. white, numerous; sepals yellow-green, ovate, rather acute, erect-spreading and not reflexed in age; petals obovate-oblong, scarcely twice as long as the sepals. E. Siberia and the islands of Bering Sea.—Much of the so-called American *S. davurica* and apparently more or less of the material cult. as *S. dahurica* is really *S. Lyallii* from which it differs in having the peduncles hairy instead of glabrous and many- instead of few-fld., smaller fls. and other characters. Somewhat similar to *S. virginiensis*.

40. **Lyallii,** Engl. (*S. dahùrica*, Lyall. *Micránthes Lyallii*, Small). Four to 15 in. high: rhizome slender: lvs. fresh green, obovate ("flabellate, varying to suborbicular or reniform-flabellate"), cuneate, attenuate to a basally dilated petiole, equally serrate-dentate above, glabrous, almost nerveless: infl. 6–10-fld. loosely paniculate scapes which are naked, slender, erect, almost glabrous, with very slender, erect-spreading later erect pedicels which are purple almost glabrous: fls. milk-white; calyx purple, the sepals ovate-triangular, reflexed; petals obovate-rotund, slightly clawed, 1-nerved. Rocky Mt. region, Brit. Col., Alaska, and Bering Sea region.—Has been confused with *S. davurica*, Pall., which see.

41. **micranthidifòlia,** Steud. (*S. erùsa*, Pursh. *Micránthes micranthidifòlia*, Small). Up to 3 ft. high: lvs. all basal, oblong or oblanceolate, obtuse, attenuate to a flat petiole which is partly clasping at the base, erose-dentate, sparsely and also very shortly pilose, margin short-ciliate: infl. paniculate, loosely fld. and elongated, borne on a tall softly pilose scape; pedicels filiform, densely covered with slender glandular hairs, viscid: fls. numerous, white; sepals linear-lanceolate, obtuse, finally reflexed; petals oval, obtuse, with a yellow blotch below the middle, slightly longer than the sepals. June, July. Cold mountain brooks and wet rocks, Pa. to N. C. and Tenn. B.B. 2:174; (ed. 2) 2:219.—Occasionally cult.

42. **pennsylvánica,** Linn. (*Micránthes pennsylvánica*, Haw.). Swamp Saxifrage. Tall and stout, up to 3 ft. or more high, viscid pubescent: rhizome thick: lvs. all

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basal, sometimes almost 1 ft. long, oblanceolate or oblong-spatulate, attenuate to a short petiole which is half clasping at the base, obtuse, very shortly and also remotely dentate, margin short-ciliate: infl. 4–8-fld. cymes in a large panicle at first clustered, borne on a naked erect scape which is few-striate, shortly pilose, toward the top glandulose-pilose: fls. numerous, small, greenish; calyx-lobes deltoid, spreading, in fr. reflex; petals oblong-linear or linear-lanceolate, 1-nerved, a little longer and narrower than the calyx-lobes. June, July. Swamps and low meadows, Maine to Ont. and Minn., south to Va. and Mo. B.B. 2:173; (ed. 2) 2:219.—Recommended as a bog-plant.

43. **integrifòlia,** Hook. (*Micránthes integrifòlia,* Small). Whole plant glandular-pilose, viscid, very viscid above, 4–14 in. high: caudex short and somewhat woody, the st. always solitary: basal lvs. dark green, submembranaceous, ovate-oblong, very obtuse, entire or very slightly sinuate-crenate, base spatulate: infl. paniculate, more or less loosely so or spike-like, borne on an erect naked scape: fls. white, small; calyx rather glabrous, the lobes ovate, obtuse, spreading, at length reflex; petals obovate, slightly emarginate, 1-nerved, a little longer than the calyx-lobes. Calif. northward and in the Rocky Mts.—Occasionally offered by dealers in native plants.

44. **nivàlis,** Linn. Two to 6 in. high: rhizome rather terete, short and simple but thick and hard, crowned with a tuft of lvs.: lvs. rather thick and leathery, roundish-ovate, generally abruptly narrowed to the petioles, obtuse, sharply crenate-serrate, upper surface dark green, under surface purple or red and often pubescent; bracts broad, purple or red: infl. composed of cymules aggregated into one or more terminal conspicuously bracted heads and borne on erect solitary or clustered purple or purple-tinged scapes which are glandular-viscid especially above: fls. white, very short-pedicelled or sessile; sepals ovate or deltoid-ovate, obtuse, ciliate; petals oblong to elliptic, mostly obtuse, narrowed into claw-like bases or scarcely so. June, July. Circumboreal, including N. Great Britain. B.B. 2:174; (ed. 2) 2:218 (as *Micranthes nivalis*).

45. **virginiénsis,** Michx. (*Micránthes virginiénsis,* Small). Low, viscid-pubescent plant, 3–12 in. high (occasionally taller): lvs. rosulate, thickish, ovate, obovate or spatulate, narrowed into a broad petiole, both surfaces glabrous or the upper short-pilose and the lower hirsute, crenate-toothed: infl. solitary, a small cyme, close at first, becoming loose and paniculate, which is borne on a hirsute and glandular-soft-pilose scape: fls. white, small, few or many; sepals ovate, mostly obtuse; petals obovate-oblong, double the length of the sepals: fr. ovate, the follicles united merely at base, purplish. April–June. Common on rocks and dry hillsides. New Bruns. to Minn., south to Ga., Mo., and Tenn. B.M. 1664. L.B.C. 17:1699. B.B. 2:174; (ed. 2) 2:218.—A very attractive spring-blooming plant for partially shaded spots in the wild-garden or rockery. Var. **flòre-plèno,** Hort., is a double-fld. form.

46. **punctàta,** Linn. (*S. argùta,* Don. *S. æstivàlis,* Fisch. & Mey. *Micránthes argùta,* Small. *M. æstivàlis,* Small). Six to 18 in. high: rhizome rather stout and woody: lvs. forming a basal rosette, dark green, reniform to suborbicular, equally and strongly dentate or crenate, with long almost filiform, channeled petioles: infl. a terminal, many-fld., crowded or loose panicle which is borne on the solitary, erect or ascending naked scape: fls. white, not punctate; sepals ovate-oblong, rather acute and reflexed; petals obovate or oblong, twice as long as the sepals. Asia, W. N. Amer., and in the Rocky Mts.—A variable species, the American representatives of which have been separated as *S. arguta* and *S. æstivalis,* but the differences seem too slight to be considered specific.

47. **Mertensiàna,** Bongard (*Heterísia Mertensiàna,* Small). Perennial, 4–13 in. high, subpubescent: lvs. basal, in a rosette, subrotund, base cordate, incise-lobed, the lobes quadrate, 3-toothed with the teeth obtuse or acute; the petioles long, slender, pilose and at the base with a long membranaceous sheath: infl. a loosely diffuse panicle with erect-spreading glandular-pubescent branches borne on a slender erect almost naked green scape: fls. white with very long pedicels; sepals ovate, obtuse, reflexed; petals oblong, obtuse, double the length of the sepals. Alaska to Alberta, south to Mont. and Calif.—Very similar to *S. punctata* but readily distinguished by the incise-lobed lvs.

Section VIII. DIPTERA.

A. *Lvs. roundish, more or less deeply 7-lobed, serrate: stolons when present short*.....
  B. *Longer petals entire*.....48. **cortusifolia**
  BB. *Longer petals strongly serrate*.....49. **Fortunei**
AA. *Lvs. roundish or ovate, remotely dentate: stolons usually long and slender.*
  B. *Margins of lvs. doubly crenate-dentate; the petiole twice as long as the blade: plant usually tall*.....50. **sarmentosa**
  BB. *Margin of lvs. coarsely dentate or undulate dentate; the petiole as long as or slightly longer than the blade: plant low, not over 6 in. high*.51. **cuscutæformis**

48. **cortusifòlia,** Sieb. & Zucc., also spelled *cortusæfolia.* From 6–12 in. high, not stoloniferous: lvs. basal, rather thick and fleshy, bright green, the lower part reddish, strigose-pilose, margin ciliate, roundish, 7-lobed, midlobes larger and simple or 3-lobed, acute-serrate, base cordate; petioles 3–4 times as long as the blade and broadened into a sheath ciliate with long rusty brown hairs: infl. laxly paniculate, terminal on an erect, striate, strigose-pilose scape; pedicels long, very slender, erect: fls. white; calyx-lobes lanceolate, acute; petals 3-nerved, unequal, 3 (generally) slightly longer than the calyx-lobes and obovate-lanceolate, the other 2 (sometimes 1–3) 8–10 times longer and quite entire, very long-attenuate to a claw. Oct. Japan. B.M. 6680. Var. **mádida,** Maxim. (*S. mádida,* Makino). Lvs. thin-membranaceous, deeply lobed, with the lobes 3-lobulate and incise-dentate. Oct. Japan. G.C. III. 46:370.

49. **Fórtunei,** Hook. (*Bergènia Fórtunei,* Stein). Perennial, scarcely (if at all) sarmentose, up to 2 ft.: lvs. dark green, one-colored, basal, thick, strigose-pilose, rounded-reniform, nerved, somewhat 7-lobed, the lobes rounded, strongly and acutely laciniate-serrate; petioles longer than the blade, thick, sheathing, with the sheaths ciliolate-dentate: infl. loosely paniculate, borne on a stout, erect, strigose-pilose scape; the panicle-branches glandular, spreading, 4–7-fld.; pedicels nodding: fls. white; calyx-lobes ovate, rather obtuse, spreading; petals 1-nerved, unequal, 4 smaller, lanceolate, very entire or subentire, the fifth much longer, 3 or 4 times larger than the others, strongly serrate. June–Oct. Japan. B.M. 5377. G.L. 24:351. Gn. 74, p. 622; 78, p. 564. G.C. III. 45:20. G. 6:445. G.W. 14, p. 398. Gn.W. 24:759.—A very showy species which is not entirely hardy in England, requiring winter protection. Var. **tricolor,** Hort., is a form with the lvs. irregularly blotched with rose, white, and yellow. F.S. 21:2227, 2228.

50. **sarmentòsa,** Linn. (*S. japónica,* Hort. *S. chinénsis,* Lour.). STRAWBERRY GERANIUM. In England known as MOTHER OF THOUSANDS, a name also applied to *Linaria Cymbalaria.* OLD MAN'S BEARD. Fig. 3559. Perennial, 9–24 in. high, stoloniferous, the stolons long and filiform: caudex short: lvs. basal, rather thick, strigose-pilose, reniform-rotundate, rarely rounded-ovate, nerved, doubly crenate-dentate with broad acute teeth, upper surface green veined white, lower surface

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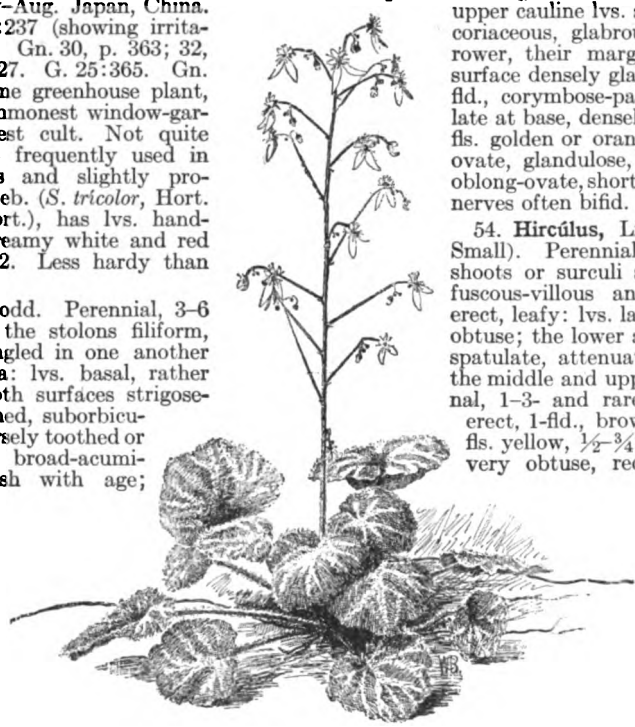
reddish; petioles twice as long as the blade, semi-terete: infl. loosely paniculate, borne on an erect, strigose-pilose scape, the panicle-branches glandulose, spreading, 4–7-fld.: fls. white, numerous; calyx short-glandular, the lobes ovate, obtusish or acute, spreading; petals 1-nerved, clawed, unequal, the 3 smaller ovate, acute, of these the two outer have a yellow spot, the middle one 2 scarlet spots, the other two 3–4 times larger and lanceolate-elliptic. May–Aug. Japan, China. B.M. 92. G.C. III. 7:237 (showing irritability of plant to light). Gn. 30, p. 363; 32, p. 37. R.H. 1876, p. 427. G. 25:365. Gn. W. 25:781.—An old-time greenhouse plant, and also one of the commonest window-garden subjects. Of easiest cult. Not quite hardy in England but frequently used in sheltered rock crevices and slightly protected. Var. **tricolor,** Sieb. (*S. tricolor,* Hort. *S. tricolor supérba,* Hort.), has lvs. handsomely marked with creamy white and red variegations. G.Z. 9:32. Less hardy than the type.

51. **cuscutæfórmis,** Lodd. Perennial, 3–6 in. high, stoloniferous, the stolons filiform, often branched and tangled in one another like the sts. of cuscuta: lvs. basal, rather thick, plano-convex, both surfaces strigose-pilose, green, white-veined, suborbicular or ovate, nerved, coarsely toothed or undulate-dentate, teeth broad-acuminate, becoming obtusish with age; petioles longer than or equaling the blade, rather terete and thick: infl. laxly secund-paniculate from below the middle of the slender, ascending, strigose-pilose scape; the panicle-branches glandulose, erect-spreading, slender, 2–3-fld.: fls. white; calyx very short-glandular, the lobes ovate, acutish, spreading; petals 1-nerved, very short-clawed, lanceolate-elliptic, 3 of them smaller and often pink toward their base and with a yellow spot, the other 2 slightly or twice longer. June, July. Japan. L.B.C. 2:186. B.M. 2631.—Not hardy in England unless very heavily protected.



3559. Saxifraga sarmentosa (×⅓). No. 50.

Section IX. Hirculus.

A. *Petals obovate*.....52. **diversifolia**
AA. *Petals elongated, oblong or ovate-oblong.*
B. *Infl. 3–12-fld., corymbose-panicled: the lower lvs. lanceolate*.....53. **turfosa**
BB. *Infl. 1–3- (rarely 5-) fld., racemose: the lower lvs. spatulate*.....54. **Hirculus**

52. **diversifòlia,** Wall. Eight to 18 in. high, forming tufts of basal lvs.: sts. hirsute below and glandular (becoming glabrous with age) above, erect and foliose: lvs. polymorphous, the lower petioled, ovate, obtuse or cordate-based, subacute, undulate, sparsely hirsute or glabrous; cauline mostly sessile, very entire, oblong-lanceolate, obtuse and glandular: infl. corymbose-racemose or paniculate, rarely few-fld.: fls. yellow, obscurely spotted, ½–¾in. across; sepals ovate, spreading, at length reflexed; petals obovate, short-clawed, 5-nerved with 4 glands at their base, exceeding the sepals. July–Sept. Himalayas and China. B.M. 6603.—Said to be the handsomest of the group and very showy when massed. Var. **foliàta,** Hubb. (forma *foliàta,* Engl. & Irmscher). Sts. erect, with 1 or more lvs., 3–20-fld.: lvs. cordate-ovate, glabrous or very shortly and densely glandular-pilose on the margin: fls. golden yellow; sepals with the nerves mostly parallel. Aug., Sept. China.

53. **turfòsa,** Engl. & Irmscher. Sts. erect, 7–14 in. high, rather densely foliose, reddish and glabrous below, pale and short-glandular-pilose above, stoloniferous at base, the stolons about 4 in. long and laxly foliate: basal and also the lower st.-lvs. lanceolate, obtuse, narrowed to a petiole as long as the blade, glabrous; middle and upper cauline lvs. sessile, oblong-lanceolate, coriaceous, glabrous; the uppermost narrower, their margin and often the upper surface densely glandular-pilose: infl. 3–12-fld., corymbose-panicled; pedicels bracteolate at base, densely short-glandular-pilose: fls. golden or orange-yellow; sepals oblong-ovate, glandulose, reflexed; petals oval or oblong-ovate, short-clawed, 3-nerved, lateral nerves often bifid. Sept., Oct. China.

54. **Hircúlus,** Linn. (*Leptásea Hircúlus,* Small). Perennial, 4–12 in. high: basal shoots or surculi short, prostrate, filiform, fuscous-villous and remotely foliose: sts. erect, leafy: lvs. lanceolate, flat, entire and obtuse; the lower and those of the surculi spatulate, attenuate to the ciliate petiole, the middle and upper lvs. sessile: infl. terminal, 1–3- and rarely 5-fld.; the peduncles erect, 1-fld., brown-villous and glutinose: fls. yellow, ½–¾in. across; sepals oblong, very obtuse, reddish ciliate; petals oblong or ovate-oblong, spotted with red at the base, 3 times longer than the sepals: fr. ovate. July–Sept. N. temperate, subarctic and alpine regions. B.B. 2:171; (ed. 2) 2:216.—An excellent plant for cold damp locations as it is a native bog-grower. Var. **grandiflòra,** Hort., is freer flowering than the type and has golden yellow fls. 1 in. across; more desirable than the type.

Section X. Trachyphyllum (Leptasea, Chondrosea).

A. *Stolons or runners absent: the young shoots leafy and also floriferous.*
B. *Sts. with a basal rosette of lvs., but few-lvd. above*.....55. **chrysantha**
BB. *Sts. equally and loosely lvd.*
C. *Axils of the cauline lvs. with buds.*
D. *Peduncles glabrous: calyx-lobes ovate-triangular*.....56. **aspera**
DD. *Peduncles glandular: calyx-lobes lanceolate.*
E. *Lvs. linear-lanceolate, gray-green; margin ciliate or spinulose*.....57. **bronchialis**
EE. *Lvs. lanceolate; under surface lineolate; margin strigose, with white hairs*.....58. **gemmipara**
CC. *Axils of cauline lvs. without buds, the lowest, however, have more or less elongated leafy shoots.*
D. *Petals oblong, 1-nerved: the cauline lvs. oblong*.....59. **aizoides**
DD. *Petals obovate, 3-nerved: the cauline lvs. lanceolate*.....60. **cinerascens**
AA. *Stolons or runners present: the young shoots sarmentose.*
B. *Fls. long-pedicelled*.....61. **Brunoniana**
BB. *Fls. almost sessile*.....62. **flagellaris**

55. **chrysántha,** Gray (*Leptásea chrysántha,* Small). Dwarf cespitose plant, 1–2 in. high, with creeping

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shoots: lvs. mostly basal, in a rosette (a few cauline), imbricated, oblong-ovate, glabrous and fleshy: infl. 1–3-fld., terminal on filiform, glandular-pubescent peduncles: fls. large, yellow; calyx-lobes ovate or oblong-ovate, obtuse; petals oval to broadly obovate, much longer than the calyx-lobes. Mountains of Colo. and New Mex.—Has been offered by dealers in native plants.

56. **áspera,** DC. More or less cespitose, 4–6 in. high, with prostrate, mostly dark purple caudicles: fl.-sts. erect or ascending, remotely lvd.: lvs. pale green, shiny, lanceolate-linear, spiny-aristate and ciliate, those of the caudicles bearing buds in the axils: infl. 1-fld. or few-fld. panicles, on glabrous peduncles: fls. yellowish white; calyx sparsely glandular below, the lobes ovate-triangular mucronulate; petals oblong or obovate-oblong, 3-nerved, double the lengths of the calyx-lobes, oblique truncate. May, June. Mountains of Eu.—A rock-loving species suitable for rockeries and alpine gardens, best grown in a moist but well-drained spot. Little known in Amer. Var. **bryoìdes,** DC. (*S. bryoìdes,* Linn.). Lvs. of the caudicles very dense, slender ciliate, the apex incurved; the cauline lvs. subapproximate, erect, appressed to the sts. which are 2–3 in. high and 1–2-fld.

57. **bronchiàlis,** Linn. Dwarf, cespitose, 4–8 in. high: sts. ascending, densely foliose at the base; fl.-sts. few-lvd.: lvs. stiffish, almost leathery, gray-green, shiny, linear-lanceolate, margin ciliate or spinulose: infl. few or many-fld., paniculate, borne on erect-spreading glandulose pedicels: fls. yellowish white with orange-red dots; calyx-lobes oblong-lanceolate, rather obtuse, glabrous; petals oblong, 3-nerved, twice as long as the calyx-lobes. May. Asia and Alaska.—The material from the Cascade Mts. of Wash. to Alberta and southward along the Rocky Mts. to New Mex., which has passed as *S. bronchialis,* has been separated under the name of **S. austromontàna,** Wiegand (*S. bronchiàlis,* Pursh, not Linn. *Leptásea austromontàna,* Small). It differs from *S. bronchialis* in its more subulate, darker green lvs., more slender often purple sts., more slender pedicels, smaller white petals with purple dots above and not clawed at the base. *S. austromontana* is probably not in cult.

Var. **cherlerioìdes,** Engl. (*S. cherlerioìdes,* Don. *S. Stelleriàna,* Merck., also spelled *Stellariàna. Leptásea cherlerioìdes,* Small). Densely cespitose, with the caudicles very densely imbricate-leafy: lvs. short, flat above, convex below, somewhat spatulate, acute-mucronate: fl.-sts. shorter, 2–3 in. high, few-fld., glandulose or glabrous: fls. white; calyx-lobes rather obtuse. May. Asia and N. Amer., Unalaska, Bering Straits.

58. **gemmípara,** Franch. Sts. erect from a long rhizome, 4–5 in. high, branched, the branches rising from pockets, pilose below; the axils with buds: lvs. lanceolate, long-mucronate, entire, pale, shiny and lineolate on the under surface, both surfaces and the margin strigose with white hairs: infl. paniculate-corymbose, borne on a densely glandular fl.-st. which is naked above; pedicels bracteolate at their base: fls. yellow to white; sepals lanceolate, glabrous or glandulose, scarcely or not spreading; petals oblong, obtuse, abruptly attenuate to a long claw, twice as long as the sepals. July–Sept. China.

59. **aizoìdes,** Linn. (*Leptásea aizoìdes,* Haw.). Loosely cespitose, 2–6 in. high, with decumbent or ascending, foliose, glabrous or sparsely very short pilose caudicles which are branched from the base: lvs. green or reddish, the lower linear or linear-oblong, mucronate, flat below, above slightly convex, glabrous or more or less rigid-ciliate; the upper rather remote, smaller, oblong, rather obtuse, rarely ovate: infl. 1-fld., often many-fld., racemose, borne near the top of the st. on axillary peduncles: fls. yellow, more or less spotted with orange; calyx-lobes oblong-triangular, obtuse, spreading; petals oblong, 1-nerved, 1½ times as long as the calyx-lobes. June–Aug. Eu., Asia, arctic Amer., south to Gulf of St. Lawrence, mountains of N. Vt., W. N. Y., and the Lake Superior region. B.B. 2:171; (ed. 2) 2:217. (The Rocky Mt. form has been segregated as *S. Van-Brúntiæ,* Small.)—Usually found in stony places where there is trickling water. Very easy to grow and may be divided almost any time. Var. **aurantiaca,** Hort., is a form with the fls. described as of "old-gold passing off to a kind of coppery red." Var. **atrorùbens,** Engl. (*S. atrorùbens,* Bert.). Lvs. stiffly spinulose-ciliate: fls. rich crimson (Engler says orange-red or cinnamon-colored). Cent. Eu.

60. **cineráscens,** Engl. & Irmscher. Densely cespitose, 2–4 in. high, the caudicles prostrate, rosulate-lvd.: lvs. of the caudicles rather stiff, linear-lanceolate, margin cartilaginous and lax-ciliate or ciliate-spinulose, apex tapering to a persistent awn, under surface shining, whitish; the cauline lvs. lanceolate, rather stiff, aristate, margin densely short, black glandular-pilose: infl. 1–3-fld., on fl.-sts. which are often reddish their whole length and black glandular-pilose as are the pedicels: fls. golden yellow; sepals ovate, subacute, not reflexed; petals obovate, narrowed to a stipitate base, 3-nerved, the lateral nerves bifid. Sept. China.—Rare.

61. **Brunoniàna,** Wall. Fig. 3560. Lax, cespitose, 2–8 in. high, very glabrous, stoloniferous; the stolons wiry, filiform and reddish: sts. erect, slender: lvs. stiffish, light green, becoming gray in age, linear-lanceolate, cartilaginous-mucronate, setose-ciliate; the lowest imbricate, erect and appressed; the upper few and smaller: infl. 1–4-fld. corymbs; the peduncles and pedicels glandulose, the latter 3 or 4 times longer than the fls.: fls. light yellow; calyx-lobes ovate, obtuse; petals oblong, obtuse, 3-nerved, 3–4 times longer than the calyx-lobes. July, Aug. Temperate Himalaya. B.M. 8189.—*Spatularia Brunoniana,* Small, is not this species but a variety of *S. leucanthemifolia. S. Brunoniana* spreads freely by means of its runners and likes a moist spot. Not commonly in cult. in Amer. Var. **grandiflòra,** Hort., is offered in the trade. Var. **majúscula,** Engl. & Irmscher (*S. majúscula,* Hort.). Larger than the type: sts. 3–8 in. high: infl. composite, 3–9-fld.; the branches 1¾–4 in. long. Sept., Oct. China.

3560. Saxifraga Brunoniana.

62. **flagellàris,** Willd. (*Leptásea flagellàris,* Small). Sts. simple, erect, 1–8 in. high, leafy, densely glandular-pilose: the plant stoloniferous, the stolons bearing a minute bud and roots at their apex: lvs. more or less minute, glandular-pilose, margin glandular-pilose or setose-ciliate; the basal and lower lvs. close together, obovate-oblong; the upper lanceolate: infl. corymbosely 1–10-fld.; the pedicels very short: fls. large, golden yellow; calyx divided beyond the middle or even to the base, the lobes oblong, obtuse, densely glandular-hirsute;

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petals obovate-cuneate, the apex obtuse, 5–7-, rarely 9-nerved, 2 or 3 times longer than the calyx-lobes. May–July. Boreal and alpine Eu., Asia, and N. Amer., southward in the Rocky Mts. to Ariz. J.F. 3:237. Gn. W. 25:530.—It requires a moist boggy situation and is difficult to carry through the winter.

Section XI. ROBERTSONIA.

A. *Lvs. of the rosette obovate or obovate-oblong, attenuate to a flat petiole.*
B. *Blades of lvs. very glabrous: panicle-branches 1–3-fld.*.....63. **cuneifolia**
BB. *Blades of lvs. sparsely hirsute: panicle-branches 3–6-fld.*.....64. **umbrosa**
AA. *Lvs. of the rosette ovate or orbicular; the petiole round or roundish*.....65. **Geum**

63. **cuneifòlia,** Linn., sometimes misspelled *cunæifòlia*. Laxly cespitose, 4–6 in. high, with slender subligneous caudicles: sts. slender, erect, short-glandular and naked: lvs. very glabrous, rather thick, the upper surface dark green and shiny, the lower paler and dull or violet, obovate or subrotund, very obtuse, cuneately attenuate to a long flat ciliate petiole, margin slightly cartilaginously repand-crenate: infl. a loose panicle with 1–3-fld. branches: fls. white; calyx-lobes oblong-triangular, very obtuse; petals oblong, 3-nerved with a yellow spot at the base (occasionally also spotted with purplish red dots). June, July. Mountains of Eu.—There is a form of this species which is grown as **S. Búckiandii,** Hort., which only differs in having 2 or 3 yellow spots on each petal.

Var. **subíntegra,** Ser. (*S. apennìna,* Bert. *S. cuneifòlia* var. *appennìna,* Koch. *S. capillipes,* Reichb.). Caudicles long, scantily lvd., forming a rosette at their tip: lvs. smaller, retuse, few-dentate or entire, petiole equaling the blade: sts. few-fld., simple paniculate. Switzerland, Tyrol, Apennines, and Maritime Alps.

64. **umbròsa,** Linn. LONDON PRIDE. ST. PATRICK'S CABBAGE. Loosely cespitose, 6–12 in. high, with subligneous caudicles: sts. erect, naked: lvs. forming a dense rosette 6–12 in. across, rather thick, leathery, gray-green, dull shiny, lower surface tinged reddish or violet, oblong or obovate-oblong, sparsely hirsute, very obtuse, attenuate to the ciliate (rarely glabrous) petiole, margin obtusely crenate: infl. laxly paniculate with 3–6-fld., shortly glandulose-hirsute branches: fls. white, varying pink; calyx-lobes oblong, rather obtuse; petals oblong-ovate, 3-nerved, with several red dots at their base and a yellow spot in the middle. June, July. Eu.—A very neat and attractive plant, frequent in European gardens, but rarely seen here. Var. **acanthifòlia,** Hort., is offered in the trade. Var. **bellidifòlia,** Hort., is offered in the trade. Var. **crassiphýlla,** Hort., is offered in the trade. Var. **eròsa,** Hort., is offered in the trade. Var. **fòliis-variegàtis,** Hort., a form with the lvs. variegated. Var. **grácilis,** Hort., is offered in the trade. Var. **marmoràta,** Hort., is offered in the trade. Var. **primuloìdes,** Hort. (*S. primuloìdes,* Hort.), is described as follows: Will grow in sun, but prefers entire or partial shade. It forms masses of dark green rosettes of primula-like lvs., whence rise a host of slender sts. about 6 in. high, bearing little fls. of a kind of rose-pink (fls. also stated to be bright carmine-rose). Var. **rotundifòlia,** Hort., is offered in the trade. Var. **serratifòlia,** Don. (*S. serràta,* Sternb. *S. serratifòlia,* Mackay), is a form with erect, oblong lvs. whose margins are acutely serrate. Ireland. There is a form of this variety known as *S. umbròsa serràta mìnor.* Var. **variegàta,** Hort., is a form with the lvs. variegated with white.

65. **Gèum,** Linn. (*Micránthes Gèum,* Small). Six to 12 in. high, with subligneous caudicles: sts. nearly naked, erect, glandular-hirsute: lvs. variable, reniform-cordate, margins cartilaginous, crenate, the crenations equal except toward the very top where they are shorter, both surfaces but especially the lower hirsute, petioles 3–4 times longer than the blade and channeled above: infl. paniculate, the branches 3–6-fld., pedicels slender; fls. white; calyx-lobes oblong, obtuse; petals ovate-oblong, twice as long as the calyx-lobes, with a yellow spot at their base and occasionally with several smaller purple-red dots. May, June. Pyrenees, Ireland and said to occur in Newfoundland.—A species in common cult. abroad and very variable, by some considered as a variety of *S. umbrosa.* Var. **crenàta,** Hort., (*S. umbròsa* var. *crenàta,* Ser.). Lvs. crenate or crenate-dentate: fls. pink, unspotted. Pyrenees. Var. **crinìtum,** Hort., is said to resemble a refined form of *S. umbrosa.* Var. **dentàta,** Engl. (*S. dentàta,* Link. *S. hirsùta,* Linn. *S. umbròsa* var. *hirsùta,* Hort. *S. umbròsa* var. *dentàta,* Hort.). Lvs. rather glabrous or hirsute, orbicular, acute-serrate: fls. white with 1 yellow dot or even several purple dots on each petal (by some said to be unspotted).

Section XII. EUAIZOONIA (CHONDROSEA).

A. *Fls. white (frequently dotted with red or purple).*
B. *Margin of the lower lvs. reflexed and crenulate or almost entire.*
C. *Upper surface of lower lvs. convex.*66. **longifolia**
CC. *Upper surface of lower lvs. sulcate or flat.*
D. *Surface of lf. sulcate.*
E. *Lower lvs. more or less spatulate or obovate.*
F. *Apex of lvs. rather acute: calyx-tube glabrous*.....67. **lingulata**
FF. *Apex of lvs. more or less obtuse: calyx-tube glandular.*
G. *Lvs. obovate-ligulate*....68. **catalaunica**
GG. *Lvs. linear at base, spreading above into a spoon-shaped blade*...69. **cochlearis**
EE. *Lower lvs. linear: the plant 1–3-in. high*.....70. **crustata**
DD. *Surface of lf. flat*.....71. **Hostii**
BB. *Margin of the lower lvs. not reflexed, serrate.*
C. *Fl.-sts. paniculate above.*
D. *Cauline lvs. oblong, obtuse*.....72. **altissima**
DD. *Cauline lvs. spatulate or oblanceolate, acute.*
E. *Calyx-lobes ovate; petals obovate or elliptic.*
F. *The lvs. spatulate*.....73. **Aizoon**
FF. *The lvs. oblong or obovate.*.75. **cartilaginea**
EE. *Calyx-lobes lanceolate-elliptic; petals oblong-elliptic*.....74. **Zelebori**
CC. *Fl.-sts. paniculate, branching from the base*.....76. **Cotyledon**
AA. *Fls. commonly not white.*
B. *Petals pink or purple (sometimes white or white tinted pink)*.....75. **cartilaginea**
BB. *Petals yellow, red-orange or copper-colored*.....77. **mutata**

66. **longifòlia,** Lapeyr. One to 2 ft. high: st. erect, densely glandular: lvs. basal, very numerous, forming a thick rosette which is frequently 6–7 in. diam., convex, linear-lanceolate, light or gray-green edged silvery, 6 in. long, base ciliate, margin erose-crenulate: infl. a full, pyramidal panicle, branched from the base, many-fld., everywhere glandulose-pilose: fls. white, sometimes dotted purple toward the center; calyx-lobes ovate or oblong, obtuse; petals obovate, 3-nerved, the midnerve usually bifid toward the apex. June, July. Pyrenees. B.M. 5889. G.C. III. 28:402; 39:149; 52:244, 245. Gn. 66, p. 105; 70, p. 124; 72, p. 142; 76, p. 103. G.W. 10, p. 91. G. 14:347.—This species will grow in any rock crevice and is very showy in lf. and in fl., but it has the unfortunate habit of dying when through flowering. Prop. by seed but care must be taken as it hybridizes very readily. Var. **hýbrida,** Hort., is a form which is offered in the trade: grows 18 in. high: fls. white. Var. **magnífica,** Hort., is a form with large rosettes up to

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12–14 in. diam. and very profusely fld. panicles which attain a length of 2 ft. and a diam. of 16 in. The fls. are white. G.C. III. 53:390 (as *S. longifolia*). Gn. 77, p. 298; 79, p. 30.

67. **lingulàta,** Bell. Fig. 3561. One to 2 ft. high with ascending branched caudicles which are covered with appressed vestiges of lvs. and form a cespitose clump: sts. erect or ascending, usually glabrous or sometimes sparsely glandular-pilose, leafy: basal lvs. numerous and rosulate, sulcate above, usually linear-spatulate and rather acute, somewhat ciliate, margin erose-crenulate and crustate with lime; cauline lvs. shorter, the margin cartilaginous and less crustate: infl. a thyrsoid panicle from the middle of the scape or above, the branches slender, corymbose-paniculate at their tip, 3–5-fld., very often secund: fls. small, white; calyx glabrous, the lobes ovate or oblong, very obtuse; petals obovate or obovate-oblong, attenuate toward the base, 3-nerved, 2 or 3 times longer than the calyx-lobes. June, July. S. Eu. B.M. 8434. Gn. 79, p. 188. G.C. III. 49:65, note.—A variable species requiring lime and good drainage. Var. **Álberti,** Hort. (*S. Alberti,* Regel & Schmalh.), is probably a hybrid: it has much larger rosettes and the infl. is more spreading: fls. white, heavily spotted red. Turkestan. Var. **austràlis,** Engl. (*S. austràlis,* Moric.), usually has longer and broader spatulate lvs. which are nearly flat on the top. Italy and Sicily. Var. **Bellárdii,** Hort., equals the type. G.C. III. 54:135. Var. **lantoscàna,** Engl. (*S. lantoscàna,* Boiss. & Reut.). Lvs. short, blunt, spatulate, more or less attenuate at the base but not so at the apex; margin narrowly crustate. Maritime Alps. G. C. II. 15:109. Gn. 64, p. 61; 73, p. 55. Minor forms of this variety are cult., as *S. lantoscàna erécta,* having pure white fls., and *S. lantoscàna supérba,* having arching plumes of creamy white fls. larger than those of the variety proper.

3561. Saxifraga lingulata.

68. **catalaùnica,** Boiss. & Reut. Densely cespitose, 1–2 ft. high: lvs. of the rosette, which grows to be 3 in. diam., erect-spreading, obovate-ligulate, rather obtuse, margin subentire and white-crustate, glabrous, glaucous, subcanaliculate above; the cauline lvs. few, obovate-oblong: infl. a slender-branched cymose panicle borne on an erect few-lvd. fl.-st. with erect bracteolate slender glandular-viscid pedicels, which are longer than the fls.: fls. white; sepals oblong, obtuse, glabrous, longer than the glandular tube of the calyx; petals spatulate-oblong, 3 times as long as the sepals. May, June. Spain. Gn.W. 25:125.—By some considered only a variety of *S. lingulata.*

69. **cochleàris,** Reichb. (*S. lingulàta* var. *cochleàris,* Engl.). Six to 9 in. high, densely cespitose, with short much-branched caudicles covered below with withered lvs.: lvs. densely rosulate, spreading, ½–1 in. long, linear at their base, toward the top spreading into a rounded or spatulate blade, glaucous, coriaceous, margin cartilaginous and crustate with lime; the cauline lvs. small, linear, acute, red-brown: infl. paniculate, erect and open, either thyrsoid or subcorymbose, borne on very slender bright red-brown fl.-sts.: fls. white, ½–¾ in. diam.; calyx red-brown, the lobes small, ovate, obtuse; petals obovate, apex rounded. June, July. Maritime Alps. Eu. B.M. 6688. G.C. III. 44:245; 51:174. Gn. 74, p. 326. Var. **màjor,** Hort., has much larger rosettes of lvs. and taller sprays of fls. It is suggested that it may be of hybrid origin. Var. **minor,** Hort. (*S. Probýnii,* Correv.), has minute rosettes of silvery lvs. and much shorter sprays of fls. which are white.—Apparently some of the material grown as *S. valdensis* is referable to this.

70. **crustàta,** Vest (*S. incrustàta,* Vest). About 1–3 in. high with ascending branched caudicles which are covered with appressed vestiges of lvs. and form cespitose clumps up to 4 or 5 in. diam.: sts. ascending, densely glandular-pilose: basal lvs. light gray-green, the lower third pink, sulcate, linear, obtuse, minutely crenulate with the crenatures very close together, crustate with lime, ciliate toward the base; cauline lvs. few, linear-lanceolate, serrate, glandular at base: infl. a scape, racemose from the middle or above, the branches 1-fld. or paniculate 3–6-fld.: fls. yellowish white sometimes purple-dotted toward the center; calyx sparse-glandulose at base, the lobes oblong-triangular with membranaceous margins; petals obovate, base scarcely attenuate, almost 3 times as long as the calyx-lobes. June. Tyrol.—Easy to grow and adapted to a shady location; scarcely known in Amer.

71. **Hòstii,** Tausch (*S. elàtior,* Mert. & Koch. *S. Aizoòn* var. *Hòstii,* Hort.). Cespitose, 6–18 in. high: sts. erect, rather stout and glandular-pilose: basal lvs. numerous, rosulate, rather erect, lingulate with an obtuse apex and ciliate base, margin crenulate, the crenatures truncate; cauline lvs. oblong, rather obtuse, crenate-serrate; bracts oblong-linear, glandular ciliate: infl. a scape, paniculate above the branches, elongated, naked and densely glandular-pilose; the pedicels densely short-glandular: fls. white, often with numerous purple dots toward the center; calyx-lobes ovate-triangular; petals oblong or obovate-oblong, double the length of the calyx-lobes. May–Aug. Mountains of Cent. Eu.—A strong grower and said to produce offsets very freely and in this way spread rapidly. Var. **rhætica,** Engl., also spelled *rhætica* (*S. rhætica,* Kerner). Basal lvs. linear-lingulate, apex rather acute: petals obovate-oblong, white with numerous purple dots above the middle. Mountains of Austria.

72. **altíssima,** Kerner (*S. Hòstii* var. *altíssima,* Hort.). Fig. 3558. Cespitose, 1–2 ft. high: sts. erect, stout, glandular-hirsute: lvs. thick, the basal spreading, broad, tongue-shaped, rather acute, base ciliate, margin serrate, serratures acute and cartilaginous; cauline lvs. oblong, rather obtuse, serrate; bracts oblong-linear or linear, obtuse and glandular-pilose ciliate: infl. a scape racemosely paniculate above, the branches about 10-fld. and densely glandular-pilose; pedicels densely short-glandular: fls. white, their base greenish and purple-dotted toward the center; calyx-lobes ovate, obtuse, cartilaginous margined; petals elliptic, 3-nerved, twice as long as the calyx-lobes. Tyrol.—Very closely allied to *S. Hostii,* possibly not specifically distinct. Little known in Amer. outside fanciers' collections.

73. **Aizòon,** Jacq. (*Chondrósea Aizòon,* Haw.). Fig. 3562. Perennial, cespitose, 4–20 in. high: sts. erect, foliose: basal lvs. curved, thick, rather flat above, smooth, the base ciliate, margin serrate, many-pored, more or less crustate with lime, serratures cartilaginous at the apex and antrorsely acuminate; cauline lvs. smaller, cuneate or spatulate, base glandular-ciliate: infl. a scape, corymbose-racemose, corymbose-paniculate or paniculate above, the branches 3–5-fld., more or less glandular-pilose, rarely glabrous: fls. cream-colored, commonly purplish red spotted in the center; calyx-lobes ovate; petals obovate or elliptical, 3–5-nerved,

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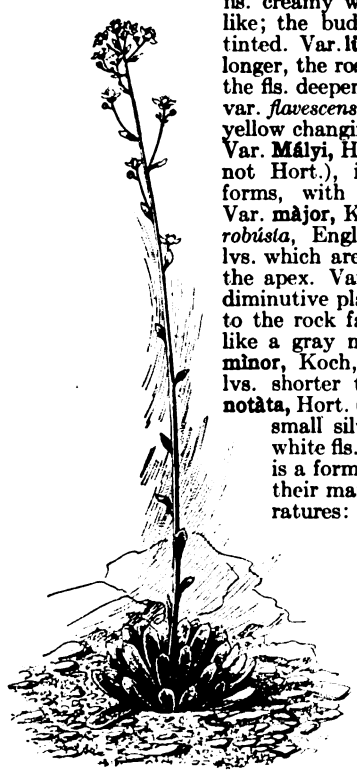
almost twice as long as the calyx-lobes: fr. globose. June, July. Alpine and boreal parts of Eu. and Asia, in N. Amer. from Greenland and Lab. to Sask., locally south to Nova Scotia, New Bruns., mountains of N. Vt., and Lake Superior. J.H. III. 69:135.—A very variable alpine plant, much tufted and forming small dense rosettes. **S. Pórtæ,** Stein, from Italy has white fls. and is apparently only a minor variation of *S. Aizoon.* Var. **ambígua,** Hort., is offered in the trade. Var. **atropurpûrea,** Hort., is said to have slender branching sts. and rose-purple fls. Var. **balcâna,** Hort., also spelled *balkàna* (*S. balcàna,* Hort.), is a form with close rosettes of medium size and rather flat white fls. with larger red spots than usual (fls. reported as sometimes pale pink). Balkan Mts. Var. **baldénsis,** Farrer, with ash-gray lvs., which are short, thick and markedly dentate; their apex rounded: the young shoots glossy, blood-crimson: fls. whitish. N. Italy. Var. **brevifólia,** Hort., with white fls. is offered in the trade. Var. **bulgárica,** Hort., has rosy spotted fls. Var. **califórnica,** Hort. (*S. califórnica,* Hort.), with white fls. must not be confused with *S. califórnica,* Greene (*Micránthes califórnica,* Small), a species of Section Boraphila, closely related to *S. virginiensis* which is probably not in cult. Var. **Chúrchillii,** Hort., with pointed gray lvs. in stiff rosettes. Var. **cultràta,** Hort., is offered in the trade. Var. **dûbia,** Hort., is offered. Var. **erécta,** Hort., is offered in the trade. Var. **flavéscens,** Hort., is a free-growing decorative form with clear lemon-yellow fls. produced in good spikes. Not to be confused with *S. flavéscens,* Hort. (*S. media* × *S. aretioides*), which is apparently scarce in cult. Var. **intácta,** Engl. (*S. intácta,* Willd.), has beautiful white, unspotted fls. *S. intácta màjor* is the cultural name of a larger form, about 6 in. high. *S. intácta mìnor* is the cultural name of a dwarf form. Var. **lagaveàna,** Hort., also known as *La Graveàna* and *La Ga Dauphane,* is a miniature plant with tiny silvery rosettes and ruddy sts. 6 in. high, bearing 4–6 fls. on each st.: fls. creamy white, thick and wax-like; the buds globular and pink-tinted. Var. **lûtea,** Hort., has the lvs. longer, the rosettes more open, and the fls. deeper yellow than those of var. *flavescens;* fls. at first primrose-yellow changing to creamy yellow. Var. **Mályi,** Hort. (*S. Mályi,* Schott, not Hort.), is one of the tallest forms, with good-sized rosettes. Var. **màjor,** Koch (*S. Aizoòn* forma *robústa,* Engl.), has oblong-linear lvs. which are not much broader at the apex. Var. **mínima,** Hort., is a diminutive plant that clings tightly to the rock faces and looks almost like a gray moss: fls. white. Var. **mìnor,** Koch, has oblong-obovate lvs. shorter than the type. Var. **notàta,** Hort. (*S. notàta,* Schott), has small silver-margined lvs. and white fls. Var. **paradóxa,** Hort., is a form with long bluish lvs., their margins with silvery serratures: fls. white. Engadine. Gn. 74, p. 463. See *S. paradoxa* in suppl. list. Var. **pectinàta,** Hort. (*S. pectinàta,* Schott, Nym. & Kotschy), has narrow lvs. with blunt teeth and conspicuous silvery margins forming small rosettes: the fls. are small, of a nice white and spotted with red.



3562. Saxifraga Aizoon. (×½)

Var. **récta,** Ser., in part (*S. récta,* Lapeyr, in part. *S. Aizoòn* forma *grácilis,* Engl. *S. carinthìaca,* Schott, Nym. & Kotschy), has lvs. which are spatulate-linear, slightly dilated toward the apex, narrowly and also deeply serrate: the sts. laxly paniculate from the middle and above; the branches 1–3-fld.; fls. white. Var. **rôsea,** Hort., is similar to the type, but has bright pink fls. Var. **rosulàris,** Hort. (*S. rosulàris,* Schleich.), has finely incurved rosettes and large sprays of white fls. Var. **Stabiàna,** Hort. (*S. Stabiàna,* Ten.), has large rosettes and sprays of creamy white fls. Not very distinct from the type. Var. **Sturmiàna,** Hort. (*S. Sturmiàna,* Schott, Nym. & Kotschy), is a good-sized form with flattish rosettes, probably referable to the type-form.

74. **Zelébori,** Schott. Sts. densely and longly glandular-pilose toward the base, decreasingly so toward the apex: lvs. of the glaucous rosette, which is 1½ in. diam., almost linear, acute, very minutely serrate, the serratures inverted-acute and contiguous (the lowest less so); cauline lvs. shorter, oblanceolate, acute, glabrous, above the middle sharply serrate (serratures rather remote), apex appressed serrate-crenate: fls. white, not dotted; calyx glabrous, the lobes lanceolate-elliptic, obtuse; petals oblong-elliptic, not clawed, obtuse, apex rounded. Serbia.—Plants under this name are offered in English trade-lists, but the species is not included in any of the recent treatments of Saxifraga. The above description is taken from Schott's original. Whether the plant offered is the same is undetermined. Probably a variation of *S. Aizoon.*

75. **cartilagínea,** Willd. (*S. Kolenatiàna,* Regel). Six to 9 in. high: st. sparingly glandulose, few-lvd.: lvs. rosulate, oblong or obovate-oblong, acute or acuminate; the margin cartilaginous toward the base, serrate, serratures antrorsely subacuminate, toward the apex subcrenate, crenatures truncate: infl. a scape, racemose or paniculate above, the branches 1–5-fld.: fls. white, rose, or purple; calyx-lobes ovate-triangular, rather acute; petals obovate, 2–3 times longer than the calyx-lobes. June–Aug. Caucausus region and Asia Minor.—*S. Kolenatiana* has been kept distinct by some but seems to differ only in the slightly more acute serratures of the lvs. In gardens it is more common under this name. A somewhat larger form is known as *S. Kolenatiàna màjor,* Hort.

76. **Cotylèdon,** Linn. Tufted, 6–24 in. high: st. erect: lvs. thick and fleshy, basal lingulate or obovate-lingulate, short-apiculate, the base softly fimbriate, margin serrate, serratures cartilaginous, at their apex antrorsely acuminate; cauline lvs. lingulate-lanceolate, the lower part glandular-ciliate, the upper serrulate; bracts linear, acute and glandular: infl. a scape, paniculate from the base, the panicle composite, pyramidal, glandular-pilose all over, the branches paniculate from their middle, 5–15-fld.: fls. white, occasionally tinged rose; calyx-lobes longer than the glandulose tube, oblong-acute; petals obovate-cuneate, 3–5-nerved, midnerve mostly bifid, 2–3 times longer than the calyx-lobes. May–July. Mountains of Eu. G. 11:209; 34:781; 35:541. G.W. 12, p. 471.—Easy to prop. as it makes a large number of side shoots which root quickly when potted. Var. **icelándica,** Maxwell (*S. icelándica,* Hort.), is the largest form of the species and produces numerous offsets. The rosettes are very large and flat and the ligulate lvs. are usually bronzed and leathery. G. 35:707. Var. **pyramidàlis,** Ser. (*S. pyramidàlis,* Lapeyr, not Ten. *S. nepalénsis,* Hort.), is a very robust form from 2–4 ft. high when in fl. The rosettes are large and glaucous and the fls. very numerous in a large pyramidal panicle, white, speckled with crimson. May, June. G.C. III. 53:389. G. 35:163. Gn. 61, p. 393; 74, p. 266; 78, p. 349. Var. **pyrenàica,** Hort., has more pointed lvs. and shorter plumes of white fls. Pyrenees.

77. **mutàta,** Linn. Six to 12 in. high: rhizome thick, horizontal or oblique: sts. ascending, foliose: basal lvs.

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lingulate, rosulate; margin cartilaginous, densely fimbriate below, entire or obsoletely serrulate above with many little indistinct pits; cauline lvs. lingulate-spatulate, very obtuse: infl. racemosely paniculate from the base or middle of the scape, this and the peduncles glandular-hirsute: fls. yellow, red-orange or copper-colored; calyx-lobes oblong-triangular, sparsely glandular-pilose or glabrous; petals linear-lanceolate, acute, 3-nerved, narrower than and twice the length of the calyx-lobes. July, Aug. Mountains of Cent. Eu. B.M. 351.—Suitable for rather heavy shade. The plant dies after flowering. Said to be biennial.

Section XIII. KABSCHIA.

A. *Caudicle lvs. broader or as broad above the middle as below it.*
B. *Petals as long as or slightly longer than the calyx-lobes: fls. reddish or purplish. (The following four species are very closely related.)*
C. *Infl. spreading, branched.*
D. *Lower lvs. spatulate-lingulate, the tip somewhat recurved* ...78. **media**
DD. *Lower lvs. spatulate-oblanceolate, the tip spreading*.....79. **Stribrnyi**
CC. *Infl. spicate or nearly so.*
D. *Rosette lvs. spatulate-lingulate, their apex rounded mucronate.*80. **Grisebachii**
DD. *Rosette lvs. linear-lanceolate, their apex acute or acutish*...81. **Friderici-[Augusti**
BB. *Petals 2–4 times as long as the calyx-lobes.*
C. *Fls. yellow.*
D. *Infl. 1–3- (rarely cymosely 3–5-) fld.: basal lvs. gray-green*.....82. **aretioides**
DD. *Infl. 4–6-fld., in a close head: basal lvs. green or somewhat glaucous*.....83. **Ferdinandi-[Coburgi**
CC. *Fls. not yellow (sometimes cream-colored), usually white, sometimes rose.*
D. *The petals obovate to cuneate: basal lvs. not recurved at tip.*
E. *Lower lvs. deeply keeled, acute.*84. **scardica**
EE. *Lower lvs. flat or slightly keeled, blunt.*
F. *Petals obovate, 3 times as long as the obtuse calyx-lobes.*
G. *Lvs. spatulate, light gray-green*.....85. **Rocheliana**
GG. *Lvs. obovate-cuneate, shorter and broader than the preceding*....86. **marginata**
FF. *Petals elliptic-spatulate, twice as long as the acute calyx-lobes*.....87. **Boryi**
DD. *The petals rounded-obovate: basal lvs. more or less recurved.*
E. *Recurved only at the tip of lf.*
F. *Infl. 1-fld.: fls. pale or rosy lilac*.....88. **lilacina**
FF. *Infl. 2–4-fld.: fls. white*...89. **squarrosa**
EE. *Recurved from the base or middle of lf.*
F. *Basal lvs. linear-oblong, rather acute*.....90. **cæsia**
FF. *Basal lvs. spatulate-linear, obtuse*.....91. **valdensis**
AA. *Caudicle lvs. narrowed above the middle.*
B. *Fls. white.*
C. *Petals obovate, base strongly cuneate-attenuate.*
D. *Cauline lvs. acute: infl. cymose-racemose, 1–3-fld*.....92. **tombeanensis**
DD. *Cauline lvs. long-mucronate: infl. corymbose-paniculate, 3–7–20-fld*.....93. **Vandellii**
CC. *Petals obovate-subrotund*.....94. **Burseriana**
BB. *Fls. yellow or yellowish green.*
C. *Stamens as long as the petals*.....95. **sancta**
CC. *Stamens decidedly longer than the petals*.....96. **juniperifolia**

78. **mèdia,** Gouan (*S. calyciflòra*, Lapeyr). Cespitose, 2–3 in. high, with short densely foliose caudicles: sts. erect, leafy, densely glandular-pilose: basal lvs. imbricated, stiff, gray-green, reddish toward their base, the rosettes flattened-depressed, spatulate-lingulate, apex acute or obtuse, margin narrowly cartilaginous, ciliate below, 7–11 pits near the margin when old; cauline lvs. spatulate, cartilaginous, and densely glandular-hirsute on both surfaces except toward the tip which is mucronate and glabrous: infl. cymose-paniculate or racemose; peduncles and calyx purplish and densely glandular: fls. flesh-colored or purplish, at length dark blue; calyx-lobes ovate; petals erect, obovate, about 3–5-nerved, scarcely longer than the calyx-lobes. June, July. Pyrenees. Gn. 78, p. 108.

3563. Saxifraga Grisebachii.

79. **Stribrnyi,** Velen., also spelled *Stribnryi, Stribnyri,* and *Striburyi* (*S. porophýlla* var. *Stribrnyi*, Velen.). Cespitose, 4–5 in. high, with short, densely foliate caudicles: fl.-sts. erect, branched, sparsely leafy, spreading, glandular-pilose: lower lvs. rosulate, spreading, sessile, spatulate-oblanceolate, apex submucronate, fleshy, above intramarginally pitted, carinate below, margin narrowly cartilaginous toward the base, sparingly ciliate; cauline lvs. oblong-spatulate, subacute, green, sometimes reddish toward the apex, margin below glandular-ciliate, both surfaces sparsely glandular-pilose: infl. cymose, branches spreading or slightly recurved up to 1½ in. long; the pedicels up to ½in. long, spreading, glandular-pilose: fls. nodding, carmine, ½in. diam.; calyx campanulate, reddish purple and densely glandular-pilose outside, the lobes subequal, oblong-ovate, apex rounded, glandular-pilose outside; petals suberect, broad-spatulate, apex obtusely dentate, glabrous, about the same length as the calyx-lobes. Feb.–April. Bulgaria. B.M. 8496. G.C. III. 46:195. Gn. 73, p. 212. G.L. 24:366.—A hardy species with grayish foliage and open infl.

80. **Grisebachii,** Degen & Doerfl. (*S. mèdia* var. *montenegrìna*, Hort.). Fig. 3563. Cespitose, 4–6 in. high, with short, densely foliose caudicles: fl.-sts. erect, leafy, densely spreading, glandular-pilose: lower lvs. imbricate, spreading, sessile, spatulate-lingulate, apex rounded-mucronate, above numerous intramarginal small pits, below carinate, margin cartilaginous, slightly ciliate toward the base; cauline lvs. spreading, oblong-spatulate, reddish, the tip contracted into a green mucron, both surfaces densely glandulose-pilose except the mucron: infl. racemose or subspicate; pedicels much shorter than the bracts: fls. purple or crimson; calyx reddish purple, densely glandular-pilose, the lobes unequal, oblong-elliptic, apex rounded; petals erect, elliptic-lanceolate, ciliate below. March. Albania and Macedonia. B.M. 8308. G. 33:513. G.C. III. 33:123. G.M. 46:119. Gn. 63, p. 180; 72, p. 215; 77, p. 120; 79, p. 31. G.W. 12, p. 470. J.H. III. 46:207.—Hardy in England.

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81. **Friderici-Augusti,** Bias., also spelled *Frederici-Augusti* and *Federici-Augusti* (*S. porophýlla*, Boiss., not Bertol. *S. sempervìvum*, Koch. *S. thessálica*, Schott.). Cespitose, 2–6 in. high with short densely foliate caudicles: sts. erect, densely glandular: basal lvs. forming a flattened rosette, linear-lanceolate, acute or acutish, glabrous, flat, entire, often ciliate at the base, remotely pitted near the margin; cauline lvs. spatulate, glandular: infl. a spike-like raceme, dark purple; pedicels all about equal and shorter than the bracts: fls. violet-purple; calyx glandular, the lobes ovate, obtuse; petals cuneate-spatulate, scarcely longer than the calyx-lobes. April. Dalmatia, Serbia, Greece, and N. E. Asia Minor. G. 35:761.—This species has been treated as *S. media* var. *Friderici-Augusti*, Engl., but differs from that species in the narrower lvs. and more spicate raceme. It has also been referred to *S. porophylla*, Bertol., as a synonym: the latter is said to have lingulate basal lvs. with obtuse apex, and flesh-colored petals. The distinctions between *S. Friderici-Augusti* and *S. porophylla* seem to be very unsatisfacory. Much of the material cultivated as *S. Frederici-Augusti* is really *S. apiculata*.

82. **aretioìdes,** Lapeyr. Cespitose, about 2 in. high, with woody, densely imbricate-foliose caudicles: sts. short and leafy, glandular-hirsute: lower lvs. sulcate, weakly keeled, leathery and stiff, both sides gray-green but violet at the base of the under surface, linear-lingulate, apex rather obtuse, margin narrowly cartilaginous, the lower portion ciliate and near the margin are 7–9 pits noticeable with age; cauline lvs. linear-spatulate, glandular-hirsute and cartilaginous except the apical portion: infl. terminal, 1–3-fld., rarely cymose, 3–5-fld.; the pedicels and calyx glandular: fls. golden yellow, calyx-lobes ovate and acutish; petals broad-obovate, 5–7-nerved, more than twice as long as the calyx-lobes. April–July. Mountains of Eu. B.M. 5849.—Should be planted on a shady ledge where it will obtain plenty of moisture. Little known in Amer. Var. **primúlina,** Hort., grows about 1½ in. high; the peduncles are paler green than the type; the fls. are true primrose-yellow and the petals are usually well rounded and fairly well imbricated.

83. **Férdinandi-Còburgi,** Kell. & Sünderm. Cespitose, about 2 in. high, with columnar foliose branched caudicles: sts. with 9–12 lvs., glandular-hairy as is the calyx and tinted red-brown: lower lvs. somewhat glaucous, up to ½in. long, little narrowed toward the top, margin fine-hairy below, apex thickened and incurved-pointed; cauline lvs. 9–12 in number: infl. close heads of 4–5 (5–6) large, rich yellow fls.: petals $\frac{5}{16}$in. long, ⅛in. wide, strongly narrowed toward the base. March, April. Macedonia.

84. **scàrdica,** Griseb. (*S. scarèllica*, J. Wood). Cespitose, 3–4 in. high, with woody, very densely foliate caudicles: sts. ascending and glandular-pilose: basal lvs. leathery, stiff, light gray-green, pale violet toward the base, oblong acute, spreading, upper surface concave, lower convex-carinate, lower margin indistinctly serrulate or ciliate, upper cartilaginous, entire, when old there are 9–15 pits near the margin; cauline lvs. few, lanceolate, acute, glandular-hirsute except the apical portion, cartilaginous and glandular-hirsute: infl. corymbose, 3–11-fld.: fls. white, ivory-white, or pale rose-red; calyx-lobes ovate, acutish; petals obovate-cuneate, 5-nerved, more than twice the length of the calyx-lobes. June, July. Orient. B.M. 8243. Gn. 65, p. 323; 69, p. 231. S. E. Eu.—Readily distinguished from *S. Rocheliana* by its keeled and more pointed lvs. The species itself is hard to grow and consequently is rare in cult. The plant grown as *S. scàrdica vèra* is the true *S. scardica*, Griseb. G. 34:199. Var. **obtùsa,** Sprague, differs from the type in having subacute to obtuse lower lvs. with fewer pits, fl.-sts. 1–3-fld. and green, and the calyx-lobes obtuse and less pubescent. March. Macedonia. B.M. 8058 (as *S. scardica*). G. 32:529.

85. **Rochelìana,** Sternb., also incorrectly spelled *Rochelliana*. Very densely cespitose-cushioned, forming mats 8–12 in. diam., 2–3 in. high, with more or less elongated, densely imbricated, foliose, often columnar caudicles: lower lvs. stiff, shiny light gray-green above, violet below, densely aggregated, horizontally spreading, spatulate, obtuse, very smooth, flat above, rather convex below the base, ciliate, 7–9 pits near the margin noticeable when old; cauline lvs. few, obovate-spatulate, cartilaginous and glandular-pilose except the apical portion: infl. corymbose-paniculate, 3–9-fld., borne on an erect purple-red glandular-pilose fl.-st.; pedicels erect, these and calyx glandulose and pale green: fls. white; calyx-lobes ovate, obtuse, erect; petals obovate, clawed-attenuate, 7-nerved, thrice the length of the calyx-lobes. April–July. E. and S. E. Eu.—Flowers freely. Var. **coriophýlla,** Engl. (*S. coriophýlla*, Griseb., also spelled *coryophýlla*). The lower lvs. smaller, less horizontally spreading, oblong, obtuse, fewer pitted: fls. ivory-white. Bosnia and N. Albania.

86. **marginàta,** Sternb. Cespitose, about 3 in. high, with caudicles which are subnaked below or short-columnar, woody and leafy: lower lvs. obovate-cuneate, obtuse, the base ciliate, the upper margin cartilaginous; cauline lvs. cartilaginous and glandular-pilose excepting the apical portion: infl. corymbose, 5–7-fld., borne on erect fl.-sts., these as well as the pedicels and calyx being black-glandular-pilose: fls. white; calyx-lobes ovate-oblong, obtuse; petals obovate, attenuate at base, 5–7-nerved, 3 times the length of the calyx-lobes. March–June. S. Italy. B.M. 6702. Gn. 77, p. 206; 79, p. 294. G.L. 18:117.—Suitable for sunny ledges and rocky crevices, but requires lime and good drainage. Some of the material cult. under this name may be *S. Boryi*.

87. **Bòryi,** Boiss. & Heldr. (*S. marginàta*, Bor. & Ch., not Sternb.). Cespitose-cushioned, about 1½ in. high, with densely imbricate-foliose caudicles which are elongated and columnar: lower lvs. oblong-spatulate, obtuse, glabrous, erect-spreading, subcoriaceous, flat above and subcarinate below, margins ciliate at base or others entire, remotely pitted near the margin; cauline lvs. few, minute and glandulose: infl. corymbose, 3–5-fld., borne on erect glandular fl.-sts.: fls. white; calyx glandular, the lobes triangular-ovate, acute; petals elliptic-spatulate, twice the length of the calyx-lobes. April–July. S. E. Eu.—Thrives in a sunny location. Closely allied to *S. marginata* but differs in having smaller lvs., acute calyx-lobes and shorter and narrower petals.

88. **lilàcina,** Duthie. Cespitose, ½–1 in. high, with numerous very densely foliose, columnar caudicles: lvs. rosulate, oblong, obtuse, recurved and thickened toward the apex, sparsely ciliate at the base, margin cartilaginous and incurved, 3–5-pitted toward the apex; cauline lvs. 1–2, alternate, erect, linear-oblong or spatulate, obtuse, glandular, half-clasping at base: infl. 1-fld., borne on glandular-pubescent fl.-sts. which are lilac: fls. about ½in. diam., pale or rosy lilac with a purple center; calyx ⅛in. long, glandular-pubescent, the lobes ovate-oblong, obtuse; petals ⅓in. long, obovate-rotund, cuneate at the base, the margins undulate. March, April. W. Himalayas. G.C. III. 35:290. Gn. 65, p. 250.—The plant is very dwarf, and is grayish green in color, though the lf.-tips are dark green.

89. **squarròsa,** Sieber. Very densely cespitose, about 3 in. high, with woody, subcylindrical caudicles which are very densely imbricate-leafy: lvs. of the caudicles dark green, imbricated, erect, becoming curved-spreading at the apex, linear-lanceolate, obtuse, submucronulate, very narrowly cartilaginous margined, at the base fimbriate, the back convex and obtusely carinate above, marked with 7 pits, crustate with lime when young;

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cauline lvs. linear, slightly carinate, 3–5-pitted: infl. 2–6-fld., borne on very slender sts. which are glandular below and sparsely glandular or glabrous above: fls. white; calyx glabrous, the lobes ovate, obtuse, slightly cartilaginous at their tips; petals subrotund-obovate, 5-nerved, the nerves straight, twice as long as the calyx-lobes. May–Aug. Mountains of Eu. G.L. 28: 185.—A small species useful in alpine-gardens in a sunny spot. It likes to be firmly wedged between stones with sufficient earth for its root-development.

90. **cæsia,** Linn. (*S. recurvifòlia*, Lapeyr). Dwarf, cespitose, about 3 in. high, with curved, woody, imbricate-foliose caudicles: lvs. of the caudicles densely congested, gray or light gray-green, arched-recurved from the base, linear-oblong, rather acute, near the margin 7-pitted, fimbriate from the base to the middle, convex and obtusely carinate dorsally, crustate with lime when young; cauline lvs. narrowly spatulate, slightly carinate, 3–5-pitted, glandular-ciliate at the base: infl. subcorymbose, 2–6-fld., borne on glabrous or sparsely glandular-pilose, green fl.-sts.: fls. snow- or cream-white; calyx-lobes ovate or obtuse, sparsely glandular, scarious at their apex, otherwise ciliate; petals obovate, 3–5-nerved, lateral nerves bowed or straight, almost 3 times as long as the calyx-lobes. June–Aug. Mountains of Eu. L.B.C. 5:421. Var. **màjor,** Don, has the sts. more robust, taller, and strongly villous: the rosettes of gray lvs. are rather larger than the type and the milk-white fls. are larger. May, June.

91. **valdénsis,** DC. Cespitose, 1–3 in. high, with short, woody, imbricate-foliose caudicles: sts. erect, glandular: lower lvs. densely congested, gray-green, light violet on the under side, erect, recurved from the middle, spatulate-linear, obtuse, dorsally convex and obtusely carinate, 9-pitted near the margin, crustate with lime, fimbriate from the base to the middle; cauline lvs. spatulate, 3–5-pitted, glandular: infl. compactly corymbose, 6–10-fld., borne on dark purple fl.-sts.: fls. white; calyx-lobes ovate, very obtuse, glandular; petals obovate, 3–5-nerved, almost 3 times as long as the calyx-lobes. May–July. Mountains of Cent. Eu. —Resembles a minute *S. lingulata* var. *cochlearis*.

92. **tombeanénsis,** Boiss. (*S. diapensioìdes* var. *tombeanénsis*, Hort.). One to 2 in. high, with numerous very densely foliose, columnar, erect, or ascending caudicles: lvs. of the caudicles imbricate, erect, incurved at their tip, ovate-lanceolate, subulate, 3-cornered, apex mucronulate, near the margin very slightly cartilaginous, very minutely serrulate, 5 minute pits are noticeable when old; cauline lvs. linear-lanceolate with the exception of the apical part, narrowly cartilaginous-marginate, acute, glandular-pilose: infl. cymose-racemose, 1–3-fld., borne on erect sts., these as well as the peduncles and calyx densely slender glandular-pilose: fls. white; calyx-lobes oblong-triangular; petals broadly obovate, strongly cuneate-attenuate toward the base, many-nerved, 3 or 4 times as long as the calyx-lobes. April. S. Tyrol and N. Italy.

93. **Vándellii,** Sternb. About 2 in. high, the caudicles very closely imbricate-foliose and also strongly congested: lvs. of the caudicles leathery, very stiff, light green, erect, lanceolate, acute, stiffly mucronate, 3-cornered, 5–7-pitted (noticeable when old) near the cartilaginous margin, fimbriate at the base, when young crustate with lime; cauline lvs. linear-lanceolate, glandular-pilose except the long-mucronate apex: infl. corymbose-paniculate, 3–7–20-fld., borne at the top of erect fl.-sts.; peduncles and calyx covered with spreading, glandular hairs: fls. white with reddish veins; calyx-lobes ovate-lanceolate, acute; petals erect, obovate, strongly cuneate-attenuate toward the base, many-nerved, 3–4 times as long as the calyx-lobes. April–Aug. Tyrol. G.C. III. 44:71; 57:238. Gn.W. 25:458.—Best suited to rock-fissures as it has deep woody tap-roots; also requires lime.

94. **Burseriàna,** Linn. Cespitose, 2–4 in. high, with densely imbricate-foliose caudicles: lvs. of the caudicles densely congested, stiff and prickly, fresh gray-green, when old light brown, 3-cornered, linear-subulate, acuminate, stiffly mucronate, 7-pitted (noticeable when old) near the cartilaginous margin, short-fimbriate at the base, crustate with lime when young; cauline lvs. smaller and appressed: infl. usually 1-fld. on glandular-pilose, remotely leafy fl.-sts., these and the calyx frequently dark purple: fls. white, the veins often colored, showy; calyx-lobes ovate, rather acute, tube glandular-hirsute; petals obovate-subrotund, base somewhat clawed, spreading. Jan. to May or June. Mountains of Cent. Eu. G. 1:793; 19:59. G.M. 54:103. Gn. 71, p. 187; 74, p. 55; 75, p. 165; 78, p. 116. G.L. 24:44; 25:392. G.C. III. 55:151. J.H. III. 69:137. G.W. 7, p. 433; 12, p. 470.—One of the earliest flowering and one of the most commonly cult. Very variable and the parent of many hybrids. Some of the varieties in cult. are: Var. **Bòydii,** Hort., equals both *S. Bòydii* and *S. Bòydii* var. *álba*, Var. **crenàta,** Hort., a form with crenate petals, close to var. *major*. G. 36:289. Var. **élegans,** Hort., equals *S. Irvingii*. Var. **glòria,** Hort., is a large-fld. form with fl.-sts. 1½ in. high: peduncles rich red: fls. pearly white, of a satiny texture, over 1 in. diam.; petals with crimped edges. G. 31:252; 35:177; 36:288. Gn. 78, p. 81. G.M. 50:213. Var. **grandiflòra,** Hort., is practically identical with var. *gloria*. G.M. 57:185. Var. **macrántha,** Hort., has minute rosettes which are very dense and form a cushion-like mound: fl.-sts. reddish, 1 in. high: fls. white and saucer-like. April. Var. **mágna,** Hort., is distinguished from var. *major* by having a very densely tufted habit: lvs. spiny, glaucous: peduncles 3 in. high and 1-fld., reddish: fls. white, more than 1 in. across, even larger than var. *gloria*. G.C. III. 47:164. Var. **magnífica,** Hort., grows about 1½–2 in. high with small dense rosettes of subulate gray lvs.: scape 1-fld.: fls. have huge, orbicular petals which are white and deeply crenate and the disk is of a paler yellow than that of var. *major*. April, May. Gn.W. 20:203; 26:251. Var. **màjor,** Hort., is less cushion-like in habit, has pronounced silvery rosettes twice as large as the type, reddish scarlet fl.-sts. 3 in. high, and fls. about 1 in. diam. with crimped white petals. Feb. Austrian Alps. G.C. II. 21:141. G. 31:253. Gn. 63, p. 75. Var. **mínima,** Hort., is said to have diminutive white fls. Var. **mìnor,** Hort., is mentioned in connection with *S. Paulinæ* as one of the parents of that hybrid. Var. **ròsea,** Hort., equals *S. Irvingii*. Var. **speciòsa,** Hort., has bright red scapes bearing solitary fls. which are larger and later than the type; the petals are pure white, broad and almost round. Var. **tridentìna,** Jenkins (var. *tridentàta*, Hort.), is more tufted than var. *major*, the fl.-sts. more richly scarlet and the fls. less notched at the margins, the petals reflexed, white. Jan., Feb. Dolomites. G. 37:379.

95. **sáncta,** Griseb. Cespitose, about 2 in. high, the caudicles densely leafy: lvs. rigid, prickly, dark green, the lower imbricate, spreading, lanceolate, acuminate, stiffly mucronate, the entire margin ciliate-denticulate, carinate, 3–5 minute pits (noticeable when old) near the cartilaginous margin; cauline lvs. lanceolate, mucronate: infl. corymbose-paniculate from the middle or upper part of the glabrous sts.: fls. small, light or rich orange-yellow; calyx glabrous, lobes ovate, entire and obtuse; petals spatulate-oblong, 3-nerved, the lateral nerves bowed. June. Macedonia.—Fine for covering moist stony banks in the rock-garden. Var. **speciòsa,** Hort., is offered in the trade as a form with fine yellow fls.

96. **juniperifòlia,** Adams (*S. juniperìna*, Bieb.). Cespitose, 1–2 in. high, the woody caudicles densely imbricate-foliose: lvs. of the caudicles green, very stiff and prickly, erect, appressed, subulate, a little broader at the ciliate base, stiffly mucronate, toward the middle

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and apex entire, almost 3-cornered, with 5–7 minute pits noticeable when old near the cartilaginous margin; cauline lvs. light green, long-ciliate at the base: infl. racemose or spicate-capitate, few-fld., borne on leafy, short, crisply villous fl.-sts.: fls. small, yellow; calyx light green, tube villous, lobes ovate, acute, mucronate, pectinately ciliate; petals oblong-spatulate, 3-nerved, slightly longer than the calyx-lobes. May–July. Caucásus.—Little known outside of botanic-garden collections.

Section XIV. Porphyrion (Antiphylla).

A. *Lvs. oblong-obovate, their apex flat or recurved.*
B. *Infl. 1-fld.: petals obovate-oblong, 5-nerved*.....97. **oppositifolia**
BB. *Infl. 2–9-fld.: petals lanceolate, 3-nerved*.....98. **biflora**
AA. *Lvs. oblong-lanceolate, recurved from their middle*.....99. **retusa**

97. **oppositifòlia,** Linn. (*Antiphýlla oppositifòlia*, Small). Caudicles procumbent and much branched, 6–8 in. long, the branches densely cespitose, the flowering ones erect, about 6 in. high at most, glabrous and 1-fld.: lvs. opposite, stiff, dark green, gray-tipped, the lower and those of the sterile branches imbricate in 4 rows, the upper rather remote, oblong or obovate, apex spreading-recurved, obtuse, thickened, 1–3-pitted, 3-cornered-carinate below: fls. showy, violet or lilac, sometimes rose-purple, terminal; calyx-lobes ovate, obtuse; petals obovate-oblong, 5-nerved, 3 times as long as the calyx-lobes. March–June, rarely Aug. Rocks, alpine and boreal parts of Eu., Asia, and N. Amer., south to Gulf of St. Lawrence, mountains of N. Vt., Mont., and Idaho. L.B.C. 9:869. G.C. III. 49:117. Gn. 71, p. 179; 76, p. 603; 78, p. 57.—An excellent little rock-plant, making a sedum-like mat, the foliage of a purplish cast. Many variations in cult. Var. **álba,** Hort., has a compact habit, very dark green lvs., and starry white fls. Var. **coccínea,** Hort., has fls. of a richer shade of purple than the type. Var. **grandiflòra,** Hort., is a form with elongated branches larger, obovate-rotund petals which are attenuate only at the clawed base and 7–9-nerved: the fls. are large and rosy purple. Pyrenees. Var. **latìna,** Farrer (*S. latìna*, Hayek), is a form with very small compact foliage and good-sized, soft rosy purple fls. whose petals are obovate, rather acute, and 5-nerved. Italy. Var. **màjor,** Hort., has creeping, rooting sts., tiny rosettes of deep green lvs., and many fls. of a rich crimson-red. This is considered by some to be identical with var. *pyrenaica* or very nearly so. Var. **pyrenàica,** Hort., is a robust very free-growing form, with large crimson fls. A form of this variety with very large rosy lilac fls. and a rather erect habit, said to come from the mountains of Wales, is cult. under the name of *S. pyrenàica supérba*. G.C. II. 21:419. Var. **Rudolphiàna,** Kittel (*S. Rudolphiàna*, Hornsh.), a form with short branches, forming small, very dense tufts: upper lvs. and calyx-lobes glandular-ciliate: sts. short and more or less erect: fls. terminal and erect; petals obovate, 3–5-nerved. Austrian Alps. Var. **speciòsa,** Farrer, has a stouter and bolder habit and foliage than other forms of the species and has very large pale rose fls. showing very little tendency toward the magenta. Var. **splèndens,** Hort. (*S. spùria* var. *splèndens*, Hort.), is a form with large fls. of a very bright purplish crimson or intense rose-purple, which are produced very freely in March. Wales.—This will grow well on a north exposure. It is also grown under the name of var. *pyrenaica splendens*.

98. **biflòra,** All. (*S. ròsea*, Lapeyr). Caudicles prostrate, branched, the branches ascending, pilose above, about 2 in. high: lvs. opposite, rather remote, thick, fleshy, green or purple, lower obovate-rotund, upper obovate-spatulate, apex rather obtuse, rarely acute, 1-pitted, sparsely pilose and also ciliate, dorsally subcarinate: infl. corymbosely paniculate, 2–9-fld.: fls. frequently in pairs, dark violet, deep purplish crimson or blackish blue; calyx broad-ovate, glandular-hirsute, lobes ovate obtuse, ciliate; petals lanceolate, 3-nerved, one-half longer than the calyx-lobes and narrower than them. April–July. Mountains of Eu.—Found wild in rocky debris watered by the melting snows. Seldom seen in cult.

99. **retùsa,** Gouan. Caudicles prostrate, much branched, the branches densely cespitose, only about 1–2 in. high; fls.-sts. erect, 1–4-fld., glandular-hirsute above: lvs. rather stiff, green with a grayish cast, the lower and those of the sterile branches imbricate in 4 rows, spreading or recurved from their middle, oblong-lanceolate, apex flat-triangular and 3–5-pitted, 3-cornered-carinate; upper lvs. obovate ciliate at the obtuse, thickened, retuse apex, base hirsute: fls. large, rich ruby- to purple-red; calyx hirsute, the lobes oblong, obtuse; petals lanceolate, twice as long as the calyx-lobes. May–July. High Alps of S. Eu. Gt. 32:1110.—May be grown on a shady ledge in rich, but stony, well-drained soil. Not common in cult.

Section XV. Peltiphyllum.

A. *Lobes of lvs. double dentate: fls. pinkish or white; petals ovate or elliptical, obtuse*.....100. **peltata**
AA. *Lobes of lvs. coarsely mucronate-serrate: fls. greenish; petals spatulate, bidentate*.....101. **tellimoides**

100. **peltàta,** Torr. (*Peltiphýllum peltàtum*, Engl.). Umbrella Plant. Perennial, 1–3 ft. high, rhizome horizontal, fleshy, 2–3 in. thick: lvs. tufted, basal, long-petioled, the petioles often 1–3 ft. long and rough-glandular, blades large, peltate, almost centrally so, often 1 ft. across, orbicular, many-lobed, rather sharply and unequally toothed: infl. corymbose, borne on simple erect scapes which are longer haired than the petioles and appear before the lvs.: fls. numerous, pinkish or white, ½in. diam.; sepals ovate to oval, obtuse, glandular-ciliate; petals ovate to elliptical, obtuse. April. Margins of streams, Calif. and Ore. B.M. 6074. F.S. 23:2441. G.C. III. 27:139. Gn. 26, p. 545; 55, p. 6. Gng. 7:307. C.L.A. 17:412.—One of the largest of all saxifrages. Hardy in Mass., with slight protection, and a most desirable plant when bold effects are desired. Var. **gigantèa,** Hort., is offered in the trade.

101. **tellimoides,** Maxim. Up to 3 ft. or more high: st. robust, erect, leafy: lvs. radical, long-petioled, the petiole provided with short adnate stipules at its base, blade suborbiculately peltate, 5 in. or more across, 7–9-lobed, the lobes ovate and mucronate-acute, unequally and coarsely mucronate-serrate: infl. cymose, many-fld.: fls. short-pedicelled, greenish; calyx-lobes triangular-ovate; petals spatulate, bidentate at their apex, twice or more longer than the calyx-lobes. Japan. R.H. 1908, p. 251.—Hardy in England and resembles *S. peltata*.

Section XVI. Hybrids.

A. BETWEEN SPECIES OF SECTION I.

102. **cordifòlia × purpuráscens,** Hort. The following named forms are some of the results of reciprocal crosses of these 2 species. They are all robust, although varying much in stature and in color of fl. **Athlete,** Hort. (*Megásea Athlete*, Hort.), said to be a fine variety. **Brilliant,** Hort. (*S. cordifòlia* var. *Brilliant*, Hort. *Megásea Brilliant*, Hort.). Lvs. large, richly tinted in autumn and winter: fls. purple; calyx and pedicels crimson. **compácta,** Hort. (*Megásea compácta*, Hort.). Fls. bright rose. **corrugàta,** Hort. (*S. cordifòlia* var. *corrugàta*, Hort. *Megásea corrugàta*, Hort.). Dwarf habit: lvs. large and rough: fls. pink. **Crœsus,** Hort. (*Megásea Crœsus*, Hort.). Very pretty with red fls.

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Delia, Hort. (*Megásea Delia*, Hort.). Fls. crimson-purple. **Distinction,** Hort. (*Megásea Distinction*, Hort.). Dwarf crowded habit, with enormous head of pale pink or rosy purple fls. **Magnet,** Hort. (*Megásea Magnet*, Hort.). Fls. rose. **Progress,** Hort. (*Megásea Progress*, Hort.). A free-growing plant, with tall scapes of rosy purple, bell-shaped fls. which are 1¼ in. across. **Puck,** Hort. (*Megásea Puck*, Hort.). Large fls. **spléndens,** Hort. (*S. cordifòlia* var. *spléndens*, Hort. *S. cordifòlia* var. *hýbrida spléndens*, Hort. *Megásea spléndens*, Hort. *M. hýbrida spléndens*, Hort.). Fls. bright or rosy crimson.

AA. BETWEEN SPECIES OF SECTION II.

103. **Vetteriàna,** Beauverd (*S. hederàcea* × *S. Huetiàna*). Lvs. intermediate between the two parents: fls. sulfur-yellow or whitish, the size of those of *S. Huetiana* and twice as large as those of *S. hederacea;* the petals more elongated than those of the last-mentioned species. June. Switzerland.—A spontaneous hybrid which appeared in the alpine garden of the Hortus Boissierianus.

AAA. BETWEEN SPECIES OF SECTIONS XI AND XII.

104. **Ándrewsii,** Harv. (*S. Gèum* × *S. Aizoòn. S. Guthrieàna*, Hort., also spelled *Guthriàna* and *Gutheriàna. S. acanthifòlia*, Hort. *S. umbròsa* var. *acanthifòlia*, Hort.). About 6 in. high: lvs. rather thick, in loose rosettes similar to *S. Aizoon*, but much longer and more or less lingulate: fls. white, thickly dotted with red for two-thirds the length of the petals. June. A spontaneous hybrid probably of garden origin. Gn.W. 25:598. —*S. Guthrieana* is credited to the Pyrenees.

105. **Éngleri,** Huter (*S. Aizoòn* × *S. cuneifòlia*). Lvs. elongate, obovate-oval, the narrowed lower portion ciliate, margin indistinctly crenate and obscurely pitted: fl.-sts. about 4 in. high, glandular-hairy: infl. laxly 2–3-fld.: fls. very small. A garden hybrid.—Quite probably all of the material grown as *S. Engleri* is not the same as another form, "with beautiful, long, silvered lvs. in handsome rosettes bearing upward of 20 handsome plumes of white fls. to a height, some of them, of more than 1 ft.," which is mentioned in English journals.

AAAA. BETWEEN SPECIES OF SECTION XII.

106. **Dr. Ramsey,** Hort. (*S. longifòlia* × *S. cochleàris*). Resembles the latter parent more, but both the spoon-shaped lvs., which take on a brilliant red tint in the fall, and the infl. of white fls. are larger than in *S. cochlearis*. The fls. are sprinkled with pink dots. A garden hybrid.

107. **spléndens,** Hort. (*S. longifòlia* × *S. Cotylèdon*). A showy plant about 1½ ft. high, with silvery rosettes more like the former parent and the looser infl. of the latter: fls. white. A garden hybrid.

108. **Burnátii,** Sünderm. (*S. cochleàris* × *S. Aizoòn*). Rather intermediate in character, but more nearly approaching the former parent in its lf.-rosettes and the infl. of large white fls. A natural hybrid found in the Maritime Alps.

109. **Grándfieldii,** Hort. Said to have been raised from *S. Aizoon* var. *rosularis*, by some said to be more probably raised from *S. Aizoon* var. *lutea*. The lvs. are ligulate, about 1 in. long and ¼in. broad, encrusted and form a basal rosette: fls. pure white, unspotted and borne on stalks 15 in. high in spreading sprays. A garden hybrid of English origin. G. 36:673.

110. **Gaudínii,** Bruegg. (*S. Aizoòn* × *S. Cotylèdon*). Also spelled *Gaudiniana*. Rosettes small and silver-gray: the fls. white. Supposed to be a spontaneous hybrid. Eu.

111. **Macnabiàna,** Hort. (*S. Cotylèdon* × *S. Hòstii. S. Hòstii* var. *Macnabiàna*, Hort.). The rosettes of lvs. are intermediate in character, but the lvs. are much smaller than in *S. Cotyledon* and the plant is seldom more than 1 ft. high, more or less branched above: fls. numerous, white, heavily speckled with pink to purple dots, the spots large. May, June. A garden hybrid. Gn.W. 20:868. J.H. III. 57:61.

AAAAA. BETWEEN SPECIES OF SECTION XIII.

112. **ambígua,** DC. (*S. mèdia* × *S. aretioìdes*). About 2½ in. high with reddish or purplish glandular fl.-sts.: lvs. linear, nearly obtuse and a little reflexed: fls. purple, red or coppery, with the petals a little longer than the calyx-lobes. Pyrenees. G.C. III. 54:183.—One of three native hybrids resulting from this cross. *S. ambigua* comes nearest to *S. media*, with red sepals and petals; *S. lùteo-purpùrea*, Lapeyr, is intermediate between the parents and has red sepals and yellow petals; while *S. Lapeyroùsii*, Don, resembles *S. aretioides* more closely; its sepals are green and its petals yellow.

113. **aurantìaca,** Hort. (*S. mèdia* × *S. aretioìdes*). More nearly resembling *S. aretioides* but the rosettes are larger: fls. yellow. Very similar to *S. luteo-purpurea*, Lapeyr.

114. **intermèdia,** Hort. (*S. Grisebáchii* × *S. Stribnryi. S. Grisebáchii* var. *intermèdia*, Hort.). Very similar in all respects to the former, but with a racemose infl. instead of a spicate one, the pedicels longer than those of *S. Grisebachii:* fls. red. Probably a natural hybrid. G.C. III. 46:195.

115. **Bertolònii,** Sünderm. (*S. Frìderici-Aùgusti* × *S. porophýlla*). Nearer the former parent in habit, about 3 in. high, the rosettes of lvs. 1½ in. diam.; lvs. long, narrow, and pointed, with the chalk-pits very evident: infl. a nodding raceme borne on a red st. with red leafy bracts which are tipped with green: fls. red, on short pedicels. A garden hybrid.—Does well in a crevice or on a ledge, but requires lime.

116. **Kéllereri,** Sünderm. (*S. Frìderici-Aùgusti* × probably a form of *S. Burseriàna*). Inclined in habit to the former, with well-developed rosettes which are nearly 2 in. diam., but the lvs. are longer and narrower and are acutely pointed and pitted with white dots: fl.-sts. 5 in. high, glandular-hairy and terminated by a cluster of erect pink-tinted fls.; the shade deeper toward the base, fls. cylindrical in form with the petals never reflexed. Feb., March. A garden hybrid.

117. **Eudoxiàna,** Kellerer (*S. Ferdinándi-Còburgi* × *S. sáncta*). An intermediate in character, but vigorous like *S. sancta*. The lvs. have the silvery appearance of the former parent and the length and pointedness of the latter: sts. tinged red and bearing a head of 2–3 deep orange-yellow fls. which are rather small. A garden hybrid raised at Sofia, Bulgaria.

118. **apiculàta,** Engl. (*S. Rochelìàna* × *S. sáncta. S. Frèderici-Aùgusti*, Hort., not Bias. *S. lùteo-purpùrea*, Hort., not Lapeyr). Cespitose, forming a large dark green mat, with subligneous, very densely lvd. caudicles: fl.-sts. 2–3½ in. high, glandular-pilose: basal lvs. linear-oblong, acutely cuspidate, slightly carinate, thick, with pitted margins; cauline lvs. subspatulate: infl. 5–9-fld., the branches 1–2-fld.: fls. yellow; calyx with the tube turbinate and densely glandular-pilose; lobes ovate-oblong, apiculate and glandulose-ciliate; petals obovate, spreading, a little longer than the calyx-lobes. Dec.–March. Said to be from the Pyrenees. B.M. 8048. G.C. III. 15:557; 39:250. G.M. 49:208. Gn. 69, p. 210; 76, p. 147. Gn.W. 20:67. G.W. 11, p. 4. J.H. III. 44:186. Var. **álba,** Hort. Habit free, the fl.-sts. 3 in. high, the fls. pure white or pale cream-colored and borne profusely. G. 34:233. Gn. 73, p. 201. Var. **Mályi,** Hort. (*S. Mályi*, Hort., not Schott, also spelled *Mayli* and *Molyi. S. lùteo-purpùrea* var. *Mályi*, Hort.), has deeper-colored fls. which are better shaped and

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later opening than the type. Var. **pállida,** Hort., a form said to have pale yellow fls., is offered in the trade.

119. **púngens,** Sünderm. (*S. Rocheliàna* × *S. juniperifòlia*). In general appearance it is similar to the latter parent, with rather smaller rosettes of dark green, sharp-pointed lvs., but with the more compact habit of *S. Rocheliana*. Its. fl.-sts. are about 1–2 in. high, glandular-hairy and tinged red-brown, bearing several deep golden yellow fls. which are larger and paler than those of *S. juniperifolia*. A garden hybrid.

120. **Bòrisii,** Kellerer (*S. marginàta* × *S. Ferdinándi-Còburgi*). It more closely resembles the latter parent. About 2–3 in. high with large rosettes of silvery lvs.; bracteate, glandular sts. each bearing 4 or 5 large yellow fls. which are paler than *S. Ferdinandi-Coburgi*. A garden hybrid raised in Sofia, Bulgaria.—*S. Kyrillii* is another product of the same cross.

121. **Kyrillii,** Kellerer (*S. marginàta* × *S. Ferdinándi-Còburgi*). Another product of the same cross as *S. Borisii* but more closely resembling the former parent. The lvs. show the chalk-pits more distinctly; the green, glandular sts. are about 3 in. high and bear pale yellow fls. which are lighter and usually larger than those of *S. marginata*. March. A garden hybrid, raised at Sofia, Bulgaria.

122. **Súndermannii,** Hort. (*S. marginàta* × *S. Burseriàna*). A smaller plant than *S. Obristii* (a result of the reciprocal cross) and resembling the latter parent more closely. About 2–3 in. high, habit tufted and free-growing, the rosettes larger than in *S. Obristii*, ⅝in. diam.: lvs. ¼in. long, broadest at the base and tapering to a point as in *S. Burseriana*, upper surface channeled or concave and covered with a chalky deposit on the margins and apex: infl. 1- or 2-fld., borne on green fl.-sts. which are obtuse, bracted, and covered with glandular white hairs: fls. white, ¾in. across; sepals obtuse, tinged red-brown and glandular; petals with crisped margins as in some forms of *S. Burseriana* and double the length of the sepals. A garden hybrid. G.C. III. 49:228.—Very free-flowering.

123. **Pétraschii,** Sünderm. (*S. tombeanénsis* × *S. Rocheliàna*). Of neat habit and very free-flowering. The plant has compact cushions of glaucous lvs. in rosettes: sts. about 2 in. high, glandular and red-tinged, bearing heads of 3–5 large white fls. which are 1 in. across. March, April. A garden hybrid. G.C. III. 49:172. G. 33:231. Gn. 75, p. 190. G.M. 54:201.—Does best on a soil which has been liberally mixed with pieces of sandstone.

124. **kestoniénsis,** Hort. Supposed to be a seedling of *S. Burseriana*, though by some said to resemble *S. scardica* var. *obtusa* more closely. It has very white fls. which come very early and are starry. The fl.-sts. are bright red and about 3 in. high. Jan.–March. A garden hybrid.

125. **Bòydii,** Dewar (*S. Burseriàna* × *S. aretioìdes*. *S. Burseriàna* var. *Bòydii*, Hort.). Plant tufted, gray and very slow-growing, fairly intermediate: lvs. more nearly resembling *S. Burseriana*, but instead of tapering to an acute point they are linear with an abrupt point: infl. 1–3-, rarely 4–5-fld.: fls. almost as large as those of *S. Burseriana*, but yellow as in *S. aretioides*. March. A garden hybrid. G.C. III. 39:250. G. 32:333. G.M. 53:317.

Var. **álba,** Hort. (*S. Burseriàna* var. *Bòydii*, Hort.). A plant which very little resembles *S. Boydii* and by some is thought to be a hybrid (*S. Rocheliàna* var. *coriophýlla* × *S. Burseriàna*). Lvs. subulate, arranged in small rosettes which form dense cushions: fls. white, borne on scapes about 2 in. high, bearing a cyme of 3–4 fls. Gn. 71, p. 178; 72, p. 177. It resembles *S. Burseriana* in many respects but differs in having larger lvs. and more fls. to a scape. Var. **késtoni,** Hort., is offered in the trade,— possibly the same as *S. kestoniensis*.

126. **Faldonside,** Boyd (*S. Burseriàna* × *S. aretioìdes*). Lvs. silvery: st. suffused with pink: fls. lemon-yellow, borne in 2's or 3's, ¾in. diam., of beautiful form with full overlapping petals which are crimped at the edges; the small orange-colored glandular disk in the center of the fl. adds to its attractiveness. Feb., March. A garden hybrid.—Free-flowering. The same cross as *S. Boydii* but freer growing and with larger fls. of a better form.

127. **Salomònii,** Sünderm. (*S. Burseriàna* × *S. Rocheliàna*. *S. salmónica*, Hort.). The habit is more that of the former but the infl. and stronger growth that of the latter parent: rosettes usually ½in. diam.; lvs. awl-shaped, 3-cornered with cartilaginous margins and decidedly glaucous: fl.-sts. 1½–2 in. high, tinged red, pubescent and covered with lvs.; fl.-buds suffused with pink, but fls. white, more the substance of *S. Rocheliana* and borne 3 or 4 to a st., about ¾in. across. Feb., March. A garden hybrid. Gn.W. 22:291.

128. **Obrístii,** Sünderm. (*S. Burseriàna* × *S. marginàta*). A robust plant, about 3–4 in. high, with rosettes about ¾in. diam.: sts. glandular and tinged red-brown: lvs. strap-shaped, acute, with 4 or 5 chalk-pits on their margins: fls. 2–4 to a st., large, almost 1 in. across, ivory-white; petals broad, rounded and overlapped as in *S. marginata*. March. A garden hybrid. G.C. III. 49:229.—It is very like an enlarged *S. Burseriana* in general appearance though the foliage is intermediate and the fls. resemble *S. marginata*. Another distinct form resulting from this cross is *S. Sundermannii*.

129. **Elízabethæ,** Sünderm. (*S. Burseriàna* × *S. sáncta*. *S. Cherrytrees*, Hort.). Very free-growing, forming cushion-like tufts: lvs. deep green, in small rosettes which are closely packed together: fl.-sts. 2 in. high, tinged red, glandular; the bracts tipped with green: fls. yellow (variously stated as sulfur, primrose, and canary), quite large and in heads of 3–5. March, April. A garden hybrid. G.L. 18:116; 25:153.

130. **Írvingii,** Hort. (*S. Burseriàna* var. *macrántha* × *S. Friderici-Augústi*. *S. Burseriàna* var. *élegans*, Hort. *S. Burseriàna* var. *ròsea*, Hort.). This partakes more of the character of the former, with similar tufts of foliage and single fls. The latter parent shows in the color of the fls. which are blush-pink, deeper at the center. The fl.-sts. are only 1 in. or so high and the plant is very free-blooming. March. A spontaneous hybrid at Kew. G.C. III. 57:158. G. 37:187. Gn. 76, p. 193; 79, p. 152. G.M. 58:149.—*S. kewensis* is another product of the same cross but more allied to *S. Friderici-Augusti*.

131. **kewénsis,** Hort. (*S. Burseriàna* var. *macrántha* × *S. Friderici-Augústi*). About 2–3 in. high with the lvs. of the latter parent but the cushioned habit of the former: sts. pale glandular-hairy; bracts red tipped with green: fls. intermediate in shape; sepals deep red and glandular, while the petals are rose, much deeper colored toward their base. March. A garden hybrid. G.C. III. 51:247.

132. **bursiculàta,** Jenkins (*S. Burseriàna* var. *màjor* × *S. apiculàta*). Plant about 3 in. high, with silver-gray rosettes: lvs. acutely pointed, glaucous and similar to the former parent, while the horizontal spread of the rosettes and their size show the influence of *S. apiculata:* fl.-sts. 3–4-fld.: fls. large and white. March. A garden hybrid. G.C. III. 49:158. G. 33:183. Gn. 75, p. 155. G.M. 54:188. J.H. III. 62:357.

133. **Paulínæ,** Sünderm. (*S. Burseriàna* var. *mìnor* × *S. Ferdinándi-Còburgi*). Habit compact, nearer like that of the latter parent, about 2 in. high, with larger rosettes of glaucous foliage: sts. tinged with red and fls. pale yellow, about ¾in. diam. March. A garden hybrid.—Somewhat resembles *S. Elizabethæ*, but the foliage is more glaucous and the rosettes are smaller. Var. **compácta,** Hort., is said to have compact cushions

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of dark green foliage and stout sprays of clear yellow fls. resembling *S. Boydii*.

134. **Haagei,** Sünderm. (*S. sáncta* × *S. Ferdinándi-Cóburgi*). This more nearly resembles the latter parent. Its habit is very compact, its foliage is similar and glaucous: fl.-sts. 2–3 in. high, bracted, tinged red-brown and glandular-hairy: fls. golden yellow, 4–5 to a st., clustered in heads. March, April. A garden hybrid. Gn. 78, p. 170.

135. **Godseffiàna,** Hort., also known as *S. Godseffi* and *S. L. S. Godseff* (*S. sáncta* × *S. Elizabethæ*). Habit of growth intermediate, foliage spiny and in close tufts: fl.-sts. 3–4 in. high, reddish and having reddish green-tipped lvs.: fls. an improvement on *S. Elizabethæ*, being deeper yellow and having better form. A garden hybrid.

S. atróvirens, Hort., is offered in the trade as a form growing 6 in. high, with white fls. Probably belongs in Section Dactyloides.—*S. Bàkeri*, Hort., is one of the smaller mossy saxifrages with vivid green foliage, a plant of compact habit with rich carmine or rose fls. Probably belongs in Section Dactyloides.—*S. Bòykei*, Hort., is offered in the trade.—*S. capillàris*, Hort., is offered in the trade as a white-fld. species.—*S. carniólica*, Hort., is offered in the trade and said to have white fls.—*S. caryophýlla*, Hort., is offered in the trade as one of the easiest to grow, fls. white. Perhaps a misspelling of coriophylla, which is a variety of S. Rocheliana.—*S. circuénta*, Hort., is said to have silvery braided foliage and pretty little panicles of white fls. borne on sts. 4 in. high. It belongs to Section Eusaxoonia.—*S. cristàta hýbrida*, Hort., is offered in the trade as a form growing 6 in. high, with white fls. Probably a form of S. Aizoon near var. paradoxa.—*S. elàtior*, Mert. & Koch=S. Hostii.—*S. eldtior*, of German authors=S. altissima.—*S. eldtior*, Wimm.=S. Aizoon var. major.—*S. Ganolíni*, Hort., is offered in the trade as growing 6 in. high with white fls.—*S. Hdwœthii*, Hort., forms cushions of rather pale green, about 6 in. high, the growth being packed and somewhat rounded at the top: fls. pure white and numerous. Probably belongs in Section Dactyloides.—*S. Héctori*, Hort., is offered in the trade.—*S. hýbrida*, Hort., not others=S. decipiens.—*S. hýbrida*, Haw.=*S. hypnoides*.—*S. incurvifólia*, Hort., not Don, is listed as belonging to the encrusted section and as having white fls.—*S. incurvifólia*, Don, is a variety of S. cespitosa.—*S. lævis*, Hort.(?) of Bieb. and of Oettingen. The plant in cult. under this name belongs to Section Trachyphyllum and has a spreading habit like S. aizoides with loose rosettes of narrow elliptic-oval lvs.: fl.-sts. about 2 in. high, tinged crimson below and bearing each 4–6, not large, rich yellow fls. Caucasus. Requires a moist situation.—*S. lævis*, Bieb., also from Caucasus, is placed in Section Kabschia by Engler, but by several other authors is said to be close to S. Aizoon or S. aizoides and may be the same as the plant in cult.; if not the one now grown as S. lævis must receive a new name.—*S. lævis*, Oettingen, seems to be the same as that of Bieb. as far as the description is concerned; the plants have not been seen.—*S. lèans*, Hort., is offered in the trade as a very compact form, 6 in. high, with white fls. Probably belongs in Section Dactyloides.—*S. Lindesiàna*, Hort., also spelled Lindisiana, is offered in the trade as a mossy species with white fls. Perhaps belongs in Section Dactyloides.—*S. lingulefórmis*, Hort., is offered in the trade.—*S. palmàta*, Hort., is uncertain and seems to be sometimes S. decipiens, sometimes S. geranioides. Var. *fóliis variegàtis* is a variety of one of these species with variegated foliage.—*S. paradóxa*, Hort., is described in a trade-list as a beautiful member of the Aizoon group with long and "braided" foliage. Presumably a natural hybrid between S. crustata and S. Hostii. Considered by some as a variety of S. Aizoon, which see.—*S. paradóxa*, Kit.=S. moschata var. pygmæa.—*S. pectinàta*, Pursh=Luetkea pectinata, Kuntze.—*S. pedatífida*, Hort., is offered in the trade as a white-fld. species.—*S. Pseùdo-Pósteri*, Hort., is offered in the trade as a hybrid of the encrusted section. Var. *sáncta*, Hort., is offered in the trade as an early yellow-fld. form.—*S. pyrolifólia*, Don=Leptarrhena pyrolifolia, R. Br.—*S. Ringedna*, Hort., is offered in the trade as a dwarf plant of spreading habit, growing 4 in. high and having white fls. Probably belongs in Section Dactyloides.—*S. rupéstris*, Lapeyr.=S. ascendens.—*S. rupéstris*, Salisb.=S. hypnoides. Which of these the material offered in the trade as a very compact plant growing 6 in. high, with white fls. cannot be determined with certainty, though probably the second as it is said to belong to the mossy section.—*S. Schroèderi*, Hort., is offered in the trade as allied to S. ceratophylla which is a variety of S. trifurcata, a species of Section Dactyloides.—*S. sexemífida*, Hort., is offered in the trade.—*S. Sibthorpii*, Boiss. Fig. 3558. Of the Cymbalaria group: perennial, cespitose, with reniform long-stalked obtuse-lobed lvs. and small yellowish fls.: petals ovate-elliptic. A good rock-plant, but seems not to be in the trade.—*S. Stánefieldi*, Wm. Robinson, is said to have a close-growing habit, dark green foliage and white fls. borne on sts. 4 in. high. Perhaps it belongs in Section Dactyloides.—*S. stellàta*, Hort., not. Pav., is offered in the trade as a white-fld. mossy plant, 1 ft. high. This is unquestionably not the stellata of Pavon which is the Peruvian representative of S. cespitosa and grows scarcely 1 in. high.—*S. stenoglóssa*, Tausch. Lvs. of the rosette rather erect, cuneate or cuneate-linear, acute, serratures narrow, the lower ones spreading, the uppermost contiguous, with the terminal tooth slightly protruding. A plant is offered under this name, but whether the same as the indeterminable Tausch species it is impossible to say. The above given description is a translation of the original of Tausch.—*S. Tantiànæ*, Hort., is offered in the trade.—*S. tasriophýlla*, Hort., is offered in the trade as a white-fld. species. Var. *persifólia*, Hort., is also offered.—*S. tenuifólia*, Hort., is offered in the trade as growing 6 in. high, with white fls. Probably belongs in Section Dactyloides.—*S. Van Houttei*, Hort., is offered in the trade. It belongs to Section Bergenia and has light pink fls.—*S. venética*, Hort., is offered in the trade as a species with minute tufts and primrose-yellow fls. belonging in the encrusted section.—*S. Webbiàna*, Hort., is offered in the trade. Possibly belongs in Section Dactyloides.

F. TRACY HUBBARD.

SCABIÒSA (Latin, *itch*, referring to medicinal use). *Dipsacàceæ*. SCABIOUS. MOURNING BRIDE. Annual or perennial herbs, their base more or less woody, comprising some of the showy and commonly cultivated garden flowers.

Leaves entire, dentate-lobate or dissected: heads terminal, depressed subglobose or ovoid-conical, pedunculate or rarely sessile in a dichotomous infl.; bracts of the involucre 1–2-rowed, herbaceous: fls. blue, rose, yellowish, or white; calyx bristly; corolla-limb 4–5-cleft, subequal or frequently oblique or 2-lipped; stamens 4, very rarely 2: achene adnate to the involucel at the base or up to the middle.—About 70 species, Eu., Asia, and Afr., rare in the tropics.

In any moderately good garden soil a succession of flowers is produced from June until frost. The flowers are very serviceable for cutting purposes. Propagated by seed or division. Many of the perennial species act like biennials in cultivation, and often flower the first year from seed. *S. atropurpurea* is a common garden annual, of easy cultivation from seed.

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KEY TO THE SPECIES.

A. *Radical lvs. dentate or lobed.*
  B. *Fls. yellow (horticultural variations of Nos. 5 and 7 are yellowish)*.... 9. **ochroleuca**
  BB. *Fls. dark purple, rose, crimson, blue, or white (forms of Nos 5 and 7 are yellowish).*
    C. *Calyx-limb sessile or nearly so.*
      D. *Surfaces of lf. pilose-pubescent with appressed white hairs*... 5. **ucranica**
      DD. *Surfaces of lf. pubescent, but not with appressed white hairs*... 10. **Columbaria**
    CC. *Calyx-limb pedicellate.*
      D. *Plant 6–18 in. high*..... 3. **stellata**
      DD. *Plant 2 ft. high*..... 7. **atropurpurea**
AA. *Radical lvs. entire.* 8. **japonica**
  B. *Plants annual.*
    C. *Lvs. oblong-spatulate*..... 6. **Reuteriana**
    CC. *Lvs. ovate-oblong*..... 4. **brachiata**
  BB. *Plants perennial.*
    C. *Prevailing shape of blade linear, but occasionally broader*..... 2. **graminifolia**
    CC. *Prevailing shape of blade lanceolate, but occasionally narrower*.. 1. **caucasica**

1. **caucásica,** Bieb. A hardy perennial 18 in. high: lvs. glaucous or whitish, the lower lanceolate-linear, acute, the upper cut and divided: heads flattish: fls. light blue. June–Oct. Caucasus Mts. Gn. 35, p. 121. G. 4:423; 25:443. Gn.W. 23:481; 26:171. Var. **álba,** Hort., has white fls. G. 29:71. G.M. 38:839. There is also a form of this, var. **álba perfécta,** Hort., which is offered in the trade—possibly the same as var. *perfecta*. Var. **magnífica,** Hort., is a large-fld. form with deep lavender-blue fls. Gn. 77, p. 445; 78:58. G.M. 56:674. Var. **pállida,** Hort., has silver-gray foliage. Var. **perfécta,** Hort., has large fringed fls. G.W. 3, p. 587.

2. **graminifòlia,** Linn. A perennial herb, somewhat woody at the base, about 1 ft. high: lvs. linear, silvery: fls. pale blue. June–Oct. Eu. B.R. 835. G. 36:643.

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3. **stellàta,** Linn. An annual plant, hairy, simple or somewhat branched, 6–18 in. high: lvs. cut or somewhat lyrate, the terminal lobe large, obovate, dentate, the upper ones often pinnately parted: fls. blue, in long-peduncled heads; corolla 5-cleft, the lobes radiate. June and later. S. Eu.

4. **brachiàta,** Sibth. & Smith. An annual species about 1 ft. high: lower lvs. ovate-oblong, the upper pinnately cut, lyrate; the lower lobes decurrent, the terminal large, obovate, oblong: fls. light blue. June and later. Eu., Asia.—Recent authors have kept this distinct as the type of the genus Callistema where it becomes *C. brachiatum*, Boiss.

5. **ucránica,** Linn. (*S. Wúlfenii*, Roem. &. Schult.). Biennial or perennial: sts. erect, branched: lvs. pilose-pubescent with appressed white hairs; the lower pinnately parted, segms. oblong or oblong-linear, entire or dentate; the upper often undivided: calyx-limb short-stipitate; corolla white or yellowish white, rarely rose or blue, lobes nearly entire or crenate: fruiting head spherical. Eu., Asia Minor, and Persia.

3564. Scabiosa atropurpurea.—The mourning bride or pin-cushion flower. (×⅓)

6. **Reuteriàna,** Boiss. Annual: st. erect, branched: lower lvs. oblong-spatulate, entire; the other lvs. lyrate, lateral segms. on each side 1–2, short, lanceolate, terminal segm. much larger: involucre setose at base: calyx-limb short-stipitate; corolla pale violet, lobes denticulate: fruiting head ovate. Asia Minor.

7. **atropurpùrea,** Linn. (*S. màjor*, Hort. *S. maritima*, Linn. *S. calyptocárpa*, St. Amans). Sweet Scabious. Fig. 3564. An annual branching plant about 2 ft. high: radical lvs. lanceolate-ovate, lyrate, coarsely dentate; st.-lvs. pinnately parted, the lobes oblong, dentate or cut: fls. dark purple, rose, or white, in long-peduncled heads, becoming ovate or oblong in fr. July–Oct. S. Eu. Gn. 21, p. 118. B.M. 247. F.S. 12:1203.—Very variable and in common cult. **S. vària,** Hort., not Gilib., is probably a name applied to mixed varieties of *S. atropurpurea*. Var. **candidíssima,** Hort., is a white-fld. form; also occurs double under the horticultural names of *candidissima flòre-plèno* and *candidissima plèna*. Var. **coccínea,** Hort., is a scarlet-fld. form. Var. **compácta,** Hort., only a compact form, probably referable to var. *grandiflora*. Var. **flòre-plèno,** Hort., see var. *grandiflora*. Var. **grandiflòra,** Hort. (*S. grandiflòra*, Hort. *S. atropurpùrea* var. *máxima*, Hort. *S. atropurpùrea* var. *flòre-plèno*, Hort.), is really a large-fld. strain occurring in several variant forms based on habit, fl.-color, and the like. One form is known horticulturally as *grandiflòra compácta*, also occurring double, and a second as *máxima plèna*. By some authorities this variety includes all the others; it is the common garden strain. Var. **màjor,** Hort., also known horticulturally as *grandiflòra màjor*, is a tall-growing form of which the following variations are named in the trade: *màjor aurantìaca*, *màjor sulphúrica*, and *màjor compácta atropurpùrea*. Var. **máxima,** Hort., see var. *grandiflora*. Var. **minor,** Hort., see var. *nana*. Var. **nàna,** Hort. (*S. atropurpùrea* var. *mìnor*, Hort. *S. mìnor*, Hort.), also known horticulturally as *grandiflora minor*, is a smaller-growing group of plants, very much branched, of which the following forms are named in the trade: *mìnor aùrea flòre-plèno*, also known as *S. mìnor aùrea flòre-plèno*, which has light yellow double fls.; *nàna fòliis-aùreis* with yellow foliage, and *nàna plèna*. Var. **pùmila,** Hort., also known horticulturally as *grandiflòra pùmila*, is a dwarf group occurring in various colors; there is also a double form horticulturally known as *pùmila flòre-plèno*. This is the group listed in the trade as Tom Thumb.—The forms of *S. atropurpurea* are among the most popular of flower-garden annuals. Seeds sown in the open ground in spring should give bloom in early summer and continue till frost. The composite-like heads are produced on long sts., good for cutting.

8. **japónica,** Miq. Perennial, tufted, about 2 ft. high, dichotomously branched: lvs. pinnatisect, lobes narrow: fl.-heads terminal or axillary, very long-peduncled, violet-blue, about 2 in. across, involucral bracts in 2 rows, very unequal, shorter than the fls. Sept. to frost. Japan.—Closely allied to *S. atropurpurea*.

9. **ochroleùca,** Linn. (*S. Columbària* var. *ochroleùca*, Hort. *S. alàta*, Hort.). A hardy perennial herb about 18 in. high: st. branching and somewhat hairy: lvs. whitish-pubescent, the radical crenate or lyrately pinnatifid, tapering to a petiole, pubescent on both sides, those of the st. 1–2-pinnately divided or cleft into oblong or linear lobes: peduncles long, slender: lvs. of the involucre shorter than the fls. June to autumn. Eu. and Asia. Var. **Webbiàna,** Hort. (*S. Webbiàna*, D. Don). Height 6–10 in.: lower lvs. canescent-villous, the upper glabrous. Resembles the type but is smaller in all its parts. B.R. 717.

10. **Columbària,** Linn. A hardy perennial quite variable in character, 2 ft. high: st. branching, glabrous or nearly so: radical lvs. ovate-obtuse, crenate, membranous, pubescent on both sides; st.-lvs. glabrous, pinnately parted, the segms. linear, entire or slightly incised: fls. blue, in ovate-globular heads on long pubescent peduncles. June–Sept. Eu., Asia, Afr. Var. **álba,** Hort., is a white-fld. form.

S. alpina, Linn.=Cephalaria alpina, Schrad.—*S. elàta*, Hornem. =Cephalaria tatarica, Schrad.—*S. lùtea*, Hort., is a perennial growing 5–7 ft. high: fls. yellow, not known botanically. G. 25:442. Var. *gigantèa*, Hort., is also offered in the trade.—*S. tatárica*, Linn. =Cephalaria tatarica, Schrad. R.B. 33:353.

F. Tracy Hubbard.†

SCABIOUS. For common scabious, see *Scabiosa*. For Shepherd's or Sheep scabious, see *Jasione perennis*.

SCÆVOLA (Latin, a diminutive of *scæva*, the *left-handed*, probably alluding to the form of the corolla). *Goodeniàceæ*. Herbs, subshrubs, or shrubs suitable for greenhouse culture: lvs. alternate: fls. solitary between 2 bracteoles, sessile or pedunculate, axillary or the peduncles dichotomously branched with a fl. in each fork; calyx-tube adnate, limb usually very short; corolla oblique, the tube slit open to the base, lobes nearly equal; ovary wholly inferior or rarely the summit free, 2-celled with 1 erect ovule in each cell, or 1-celled with 1 or 2 erect ovules: fr. indehiscent, more or less succulent.—About 83 species, mostly Australian, but also the Pacific islands, Asia, and one each in Afr. and the W. Indies. A few of the species which have been cult. are: *S. attenuàta*, R. Br., with broadly lanceolate lvs. and blue fls. in terminal leafy spikes. Austral. B.M. 4196. *S. cuneifórmis*, Labill., with obovate lower and oblong-cuneate upper lvs. and blue fls. in a long interrupted spike. Austral. *S. suavèolens*, R. Br., a prostrate, or decumbent hardy perennial or subshrub with petiolate lvs. obovate to oblong-spatulate, and blue fls. in interrupted terminal hirsute spikes. Aug. Austral. For a recent treatment of this genus, see Krause in Engler's Pflanzenreich, hft. 54 (IV. 277 and 277*a*), 1912.

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SCÁNDIX (Greek, *to sting*, in reference to the roughness of the fr.). *Umbellíferæ*. Glabrous or pubescent annual herbs, one of them grown for foliage and bloom: lvs. pinnately decompound, the segms. small and narrow: umbels composite, few-rayed, or now and then simple (1-rayed); involucre none or 1-bracted: fls. white, polygamous; calyx-teeth minute or wanting;

3565. Scandix Pecten-Veneris. (×⅓)

petals often unequal, oblong, cuneate or obovate: fr. oblong-linear, laterally compressed, long-beaked, primary ridges prominent, broad obtuse or filiform.—About 12 species natives of temperate or subtropical regions of the northern hemisphere.

Pécten-Véneris, Linn. Fig. 3565. A hardy garden annual 6–12 in. high, with finely cut lvs. and small white fls. in simple umbels. Eu.—Little grown.

S. cerefólium, Linn. See Chervil.

SCAPHOSÈPALUM (Greek, *boat* and *sepal*, alluding to the form of the lower sepal). *Orchidàceæ*. A genus separated from Masdevallia on the character of the lateral sepals, which are united into a boat-shaped organ. In habit the plants resemble masdevallias, except that the parts of the rhizome are longer, thus making the tufts less compact, and the racemes assume climbing habits, becoming very long and bearing fls. for months in succession. The dorsal sepal is free or nearly so; labellum and sepal small.—The genus contains about 10 or more species.

Grow in a coolhouse well protected from the sun. Keep the summer temperature as low as possible. Give plenty of water when growing. When at rest, water sparingly but do not allow the plants to become entirely dry. Use as small a pan as possible. The culture is like that for masdevallia. (Wm. Mathews.)

gibberòsum, Rolfe (*Masdevállia gibberòsa*, Reichb. f.). Lvs. 3–5 in. long, oblong-obovate or lanceolate, obtuse: peduncle 6–10 in. long, warty, bearing a loose raceme of 4–8 fls.: dorsal sepal boat-shaped, with a long tail, dull red, with strong, greenish ribs; lateral sepals partly connate in a concave lamina, then spreading horizontally, yellow, spotted with red and ending in yellowish tails. Colombia. B.M. 6990.

punctàtum, Rolfe (*Masdevállia punctàta*, Rolfe). Densely tufted: lvs. elliptic-lanceolate, subacute, 3–5 in. long: peduncles pendulous: fls. small, dull yellowish, thickly speckled with crimson; dorsal sepal broadly ovate, concave, strongly 5-ribbed, ending in a stiff incurved tail; lateral sepals spreading horizontally, falcately incurved, with a filiform process near the tip. Colombia. B.M. 7165. HEINRICH HASSELBRING.

SCAPHYGLÓTTIS (Greek, *boat* and *tongue*, referring to the hollowed labellum). *Orchidàceæ*. Branched epiphytic orchids grown in the warmhouse: new branches borne annually at the apex of the old branch, solitary or paired, sheathed at the base, 2-lvd. at apex, finally fleshy thickened, forming pseudobulbs which are linear or narrowly fusiform: lvs. narrow, sometimes linear, coriaceous: fls. in pairs or few in fascicles between the lvs. at the base of the innovation, small; sepals erect and rather spreading, lateral broader than the dorsal; petals similar to the sepals; labellum articulate or continuous with the foot of the column, not divided or obscurely lobed; column rather long, 2-auricled at the apex; pollinia 4.—About 15 species, Mex. to Brazil.

álba, Rolfe. Sts. fascicled, narrowly spindle-shaped, 1¾–2 in. long, 2-lvd.: lvs. linear, 1¾–2½ in. long, minutely bilobed at apex: fls. small, white, in fascicles of 3 or 4; sepals oblong, rather connivent; petals somewhat narrower; lip cuneate-oblong, nearly entire. Hab.(?).

S. Cogniauxiàna, Wildem. A small species with narrow lvs. 2–4 in. long: fls. greenish yellow; sepals acute, petals subacute. Brazil.—*S. stellàta*, Lodd., differs from S. violacea in having larger fls., with more spreading segms. and lateral lobes of the lip as large as the middle one. Guiana.—*S. violàcea*, Lindl. Sts. terete, striated, articulated: lvs. 2–3 in. long, linear or linear-lanceolate: fls. violet, minute; lateral sepals twice as broad as the dorsal; lip white, fleshy, channeled. Guiana. B.M. 4071. B.R. 1901.

F. TRACY HUBBARD.

SCHÆNÓSTOMA: *Chænostoma*.

SCHAUÈRIA (after J. C. Schauer, professor at Greifswald, 1813–1848). *Acanthàceæ*. Erect half-shrubby herbs, of greenhouse cult., with entire lvs.: fls. yellow or red, in a terminal thyrse or spike; calyx 5-parted, segms. linear or setaceous; corolla-tube long, gradually broadened upward; limb 2-lipped, the upper lip interior narrow, entire or emarginate, erect, lower lip cut into 3 subequal, recurved segms.; stamens 2 each, with 2 parallel anthers, about as long as the upper lip; aborted stamens wanting; style filiform; ovary seated on a disk, 2-loculed, with 2 seeds in each locule.—About 8 species from Brazil. Closely related to Jacobinia, from which it differs by the equal parallel anther-cells. It is distinguished from Anisacanthus by its setaceous calyx-lobes, and from Fittonia by its habit.

3566. Schaueria flavicoma, often known to the trade under the name of Justicia flava. (×⅓)

flavícoma, N. E. Br. (*Justícia flavícoma*, Lindl. *Justícia flàva*, Hort., not Kurz.). Fig. 3566. Half-shrubby plant, with erect, branched sts. up to 4 ft. high: lvs. opposite, petiolate, ovate to ovate-lanceolate, shining green, undulate: fls. light yellow, 1½ in. long, borne in erect, feathery panicles; calyx-

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lobes long, subulate, glandular-hairy, persistent after the corolla has fallen. Autumn. Brazil. B.M. 2816 (as *Justicia calycotricha*). B.R. 1027. L.B.C. 20:1921 (as *Justicia callitricha*). J.H. III. 61:277.—This plant has been confused with *S. calycótricha*, Nees, and has long been cult. under that name. *S. calycótricha*, Nees, has a smooth calyx and broader ovate lvs. which are very obtuse or subcordate at the base.

HEINRICH HASSELBRING.

SCHEÈLEA (after Scheele, distinguished German chemist). *Palmàceæ*. Pinnate palms from Trop. S. Amer. They are spineless, tall or dwarf: lf.-segms. arranged in regular series or grouped, linear, in young plants unequally and obtusely 2-cut at the apex: fls. yellowish, diœcious or monœcious, the males very numerous in the upper part of the branches, the females few or solitary in the lower part and sometimes peduncled; petals of the males long-club-shaped or cylindrical; stamens 6, shorter than the petals: fr. 1–3-seeded.—About 10 species. Almost unknown in Amer. Cult. in hot moist house. Prop. by rarely obtainable imported seeds. Considered by some the same as *Cocos butyracea*. The following species has never been described as a Scheelea and it is only by inference on Karsten's part that it can be placed there. **S. butyràcea,** Karst. This species was once cult. in S. Calif. Franceschi remarks that it comes from Venezuela and is a magnificent palm with the habit of attalea. H. A. Siebrecht states that it is rare in cult. and that it is more interesting than beautiful. On account of its large st.-base or crown, it requires so large a pot or tub for the size of the plant that it does not make a very ornamental subject.

N. TAYLOR.†

SCHEÈRIA (Frederick Scheer presented the original species to the Royal Botanic Gardens at Kew, he having received material in 1850, through J. Potts, from Chihuahua, Mex.). *Gesneriàceæ*. A name proposed for 4 Mexican and Trop. American herbs which are now referred to Achimenes (which see). From Achimenes, Seeman, its founder, distinguished it "by its truly infundibuliform, not bilobed, stigma." In habit, the genus suggests *Achimenes hirsuta*, *A. pedunculata*, and *A. multiflora*. In the American trade one species is offered, **S. mexicàna,** Seem. (*S. cærulèscens*, Hort.). St. erect, hairy: lvs. ovate, hairy, dentate, stout-stalked, opposite: fls. solitary in the axils, stalked, the corolla 2–2½ in. long, the tube inclined or drooping and curved, the wide-spreading 5-lobed limb blue-purple. Lvs. with a metallic luster. B.M. 4743. H.F. II. 3:160 (as *Shuria mexicana*). Gt. 2:354. This will be found under its accepted name *Achimenes Scheerii*, Hemsl., in the supplementary list, Vol. I, p. 208.

L. H. B.

SCHEFFLÈRA (named after G. C. Scheffler). Including *Heptapleùrum*, *Paratròpia*, and *Sciadophýllum*. *Araliàceæ*. Glabrous or pubescent trees or shrubs or sometimes climbing by means of switch-like branches, grown in the greenhouse or hardy in the far South.

Leaves various, mostly digitately compound, rarely simple and then usually mixed with compound lvs., very seldom double digitately compound: fls. in umbels, heads, or racemes, these mostly arranged racemosely, seldom in whorls; calyx-limb weakly developed, obscurely and shortly toothed or almost lacking; petals 5 or more (–15), mostly 5–6; stamens as many as the petals: fr. globose to ovate or elongated, sulcate or angled.—About 150 species in the tropical regions of the world. *Paratropia Stelzneriana*, Barb.-Rodr., belongs to this genus. See under *Paratropia*.

odoràta, Merr. & Rolfe (*Polýscias odoràta*, Blanco). A glabrous vine 6–18 ft. high: petioles longer than the lfts.; lfts. 5 or 6, smooth and shining, coriaceous, elliptic to broadly ovate, obtuse or very shortly acuminate: panicles lax, terminal: fls. greenish, 6-merous: fr. globose, fleshy. March, April. Philippines.—Occasionally cult.

S. acuminàta, Harms (Actinophyllum acuminatum, Pav. Sciadophyllum acuminatum, Poir.), has climbing sts. 10 ft. high, 7–11 oblong, obliquely acuminate, coriaceous lfts. and yellow fls. in small heads. May. Peru.—*S. cónica*, Harms (Actinophyllum conicum, Pav. Sciadophyllum conicum, Poir.), has shrubby sts. 10 ft. high, 7–13 oblong, abruptly acuminate, coriaceous lfts., and small heads of whitish red fls. May. Peru.—*S. polybótrya*, Viguier (Paratropia polybotrya, Miq. Heptapleurum polybotryum, Seem.), is a sparingly branched shrub, 5–7 oblong-ovate to obovate-oblong, caudate-acuminate lfts. and long racemes of small green fls. Winter. Java. B.M. 6238.—*S. Sciadophýllum*, Harms (Aralia Sciadophyllum, Sw. Sciadophyllum Brownii, Spreng.), has tree-like sts. 10–15 ft. high, 7–11 nearly umbellate oblong-lanceolate, glabrous unequal lfts. and white fls. in heads which are in long compound racemes. Peru.—*S. venulòsa*, Harms (Paratropia venulosa, Wight & Arn. Heptapleurum venulosum, Seem.), is a small glabrous tree or climbing shrub with glabrous entire acuminate lfts. and small compound panicles of greenish fls. India. Var. *erythrostàchya*, Hort., differs in having very large lvs., with broad lfts. and very tiny deep red fls., borne in a branched terminal panicle. Trop. Asia. B.M. 7402.—*S. vitiénsis*, Seem. (Aralia vitiensis, Gray. Agalma vitiensis, Seem.), has digitate lvs., obovate-oblong, obtuse entire lfts., with horizontally spreading veins and 3–7 fls. in an umbel. Fiji Isls.

F. TRACY HUBBARD.

SCHÌMA (said to be an Arabian name). *Ternstræmiàceæ*. Evergreen trees or shrubs, suitable for the warm-house: peduncles 1-fld., solitary in the axils or above crowded in a short raceme: fls. showy; sepals 5, slightly unequal; petals 5, much larger, connate at base, strongly imbricate, the outermost concave or somewhat hooded; stamens numerous; ovary 5- (rarely 4–6-) celled: caps. ligneous, commonly depressed-globose.—About 9 species, Trop. Asia. Here belongs a neat little tea-like shrub about 2 ft. high, known to the trade as *Gordonia javanica*. Schima and Gordonia are closely related genera, distinguished by Bentham and Hooker as follows: Schima has inferior radicles, sepals scarcely unequal, ovules few in each locule and laterally affixed; Gordonia has superior radicles, sepals markedly unequal, ovules numerous in each locule and pendulous.

Norónhæ, Reinw. (*Gordònia javánica*, Rollison). Tender evergreen shrub, 2 ft. high or perhaps more, branched, glabrous: lvs. alternate, elliptic-lanceolate, coriaceous, entire: fls. solitary in the axils, white, 1½ in. across, shorter than the lvs.; petals obovate. Java. B.M. 4539. J.F. 1:46.—A good pot-plant for the warm-house. Readily increased by cuttings.

F. TRACY HUBBARD.†

SCHÌNUS (Greek name for the mastic-tree, *Pistacia Lentiscus;* applied to this genus on account of the resinous mastic-like juice of some species). *Anacardiàceæ*. Resinous diœcous trees, one much planted in California.

3567. Schinus Molle, the California pepper-tree.

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Leaves alternate, pinnate; lfts. sessile, axillary: panicles terminal, bracteate: fls. small, whitish, with short, 5-lobed calyx, 5 imbricated petals, broad annular disk, and 10 stamens: fr. a globose drupe.—About 17 species, all S. American except one in the Hawaian Isls., one in Jamaica, and one in St. Helena. Only two are cult.; they are semi-tropical and grown in the warmhouse at the E. and in N. Eu., in the open at the S. and in Calif., as far north as the San Francisco Bay region. Molle, the old generic name, is from Mulli, the Peruvian name of *S. Molle*, and not, as sometimes supposed, Latin *molle*, soft, which would not be applicable in this case.

Schinus Molle is everywhere present in southern California, where it attains a height of 50 feet and sows itself. It was a great thing for this region in years past before the water systems had reached their present efficiency. Now the pepper-tree is under a ban, and justly so. Next to oleander the pepper-tree is most subject to black scale. Hence the pepper-trees, being large and numerous, have been indirectly a serious menace to the orchards of citrous fruits. Thousands of old trees, 2 to 3 feet in diameter, have been cut because of their proximity to orange orchards. Los Angeles boasts some magnificent avenues of them. *S. terebinthifolius* is but little known in this region, the tallest tree being only 15 feet as yet, but it is likely to be extensively planted in the near future. (Ernest Braunton.)

Mólle, Linn. PERUVIAN MASTIC-TREE. CALIFORNIAN PEPPER-TREE. Figs. 3567, 3568. Evergreen tree, 20 ft. and more, with rounded outline and graceful, pendulous branchlets when not trimmed: lvs. 9 in. or more long, glabrous, of many alternate, linear-lanceolate lfts. 1½–2 in. long: fls. in conical panicles, yellowish white: ripe frs. the size of peppercorns (whence the popular, but misleading, Californian name), of a beautiful rose-color. Peru. G.F. 8:505. R.H. 1889, p. 225. G.C. III. 17:588, 589. Gn. 25, p. 418. B.M. 3339.—In S. and Cent. Calif. more extensively cult. than any other ornamental tree except, perhaps, the blue gum (*Eucalyptus globulus*), and thriving best in the warm interior valleys, though hardy on the coast at San Francisco. Valued as a lawn and avenue tree; often planted as a street tree, for which, however, it is unsuited, being too spreading and branching too low. *Molle* was a generic name used by Tournefort, and placed in apposition with Schinus by Linnæus (explained above).

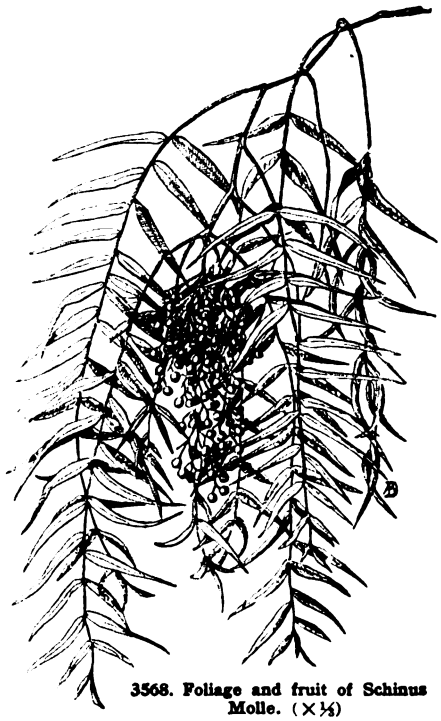
terebinthifólius, Raddi, with racemose fls., lvs. composed of 7 broader, somewhat serrated lfts. and scarlet berries, is sparingly met with in cult. in S. Calif., and proves hardy in San Francisco. Brazil.

dependens, Ort. (*Duvaùa dependens*, DC.), is a shrub or small tree, with more or less drooping branches: lvs. ⅛–1 in. long, oblong or obovate: fls. yellow, 1 line long, produced in great numbers in racemes about as long as the lvs.: berries black. W. S. Amer. B.M. 7406. B.R. 1568 (*Duvaua ovata*); 1573 (*D. dependens*); 29:59 (*D. longifolia*).—The berries are said to be used medicinally in Argentina. The genus Duvana was distinguished from Schinus chiefly by its simple foliage, but it is now considered a subgenus of Schinus.

JOS. BURTT DAVY.

SCHISMATOGLÓTTIS (Greek, *falling tongue*, referring to the fact that the limb of the spathe soon falls off). *Aràceæ*. Herbs, with stoloniferous rhizomes and the caudex above ground, grown in the warmhouse and also adapted to culture in the dwelling where a day temperature of 70° can be maintained throughout the winter.

Leaves oblong or ovate-cordate, rarely hastate or lanceolate, frequently marbled, maculate, or striped; petiole sheathing at base or nearly to the middle: peduncles solitary or fascicled: spathe cylindrical; spadix sessile, included in the spathe, upper portion male which is cylindrical or clavate, lower portion female, shorter or narrower, cylindrical or conical, sometimes the two are interrupted by an aborted male area: fls. monœcious, male perianth none; stamens 2–3, distinct; female perianth none, staminoids if present few, ovary oblong.—About 75 species, mostly natives of the Malay Archipelago. Monographed by Engler in Engler's Pflanzenreich, hft. 55 (IV. 23Da), 1912.—Among the



3568. Foliage and fruit of Schinus Molle. (×⅓)

finest variegated foliage plants of the arum family and hardly if at all inferior in beauty and ease of cult. to the popular dieffenbachias, which they closely resemble. For cult. see *Dieffenbachia* and also see *Philodendron*, to which the genus is somewhat closely allied.

A. *Petiole shortly and broadly sheathed only at base.*

tecturàta, Engler (*Colobogýnium tecturàtum*, Schott. *S. variegàta*, Hook.). Lvs. oblong-lanceolate, obtuse or rounded at the base, long-cuspidate at apex, dark green above, marked whitish along the midrib; petiole 3–4 in. long or less than half the length of the blade. Borneo.—This species has been confused in the trade with *S. neoguineensis*.

AA. *Petiole long-sheathed below.*

B. *Blade oblong-lanceolate; caudicle erect.*

concínna, Schott (*S. Lavállei*, Lind.). Lvs. lanceolate or lanceolate-oblong, rounded or narrowed at the base but not cordate, blotched with silvery white, some of the blotches much larger than others; petiole 6–8 in. long; blade 5–7 x 1⅛–2¼ in.; sheath reddish. Malaya. I.H. 28:418. Var. **immaculàta,** N. E. Br. (*S. Lavállei* var. *Lansbergiàna*, Lind.), differs in having purple sheaths and lf.-stalks, and foliage green above, dark wine-purple below. Var. **purpùrea,** N. E. Br., is a Sumatran form with foliage blotched gray above and dark wine-purple beneath.

BB. *Blade ovate, about 1½ times longer than broad; base emarginate or subcordate.*

C. *The petiole longer than blade.*

D. *Upper surface of blade ashy-blotched.*

púlchra, N. E. Br. (*S. decòra*, Bull). Lvs. ovate, obliquely cordate, irregularly blotched with silvery

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white, the total mass of green being less than the variegation; petiole 3–4½ in. long; blade 4–5 x 1¾–2½ in. Borneo. I.H. 31:520. G.C. II. 24:361.—*S. decòra* var. *Wiltmaniàna* was offered in 1893 by John Saul, Washington, D. C.

DD. *Upper surface of blade ashy-striped.*

longispàtha, Bull. Lvs. ovate, base slightly cordate, apex acuminate, upper surface broadly ashy-white-striped in the middle, otherwise green; petiole 1½ times as long as the blade. Borneo. I.H. 29:466.

CC. *The petiole about equaling the blade and verrucose.*

asperàta, Engler. Caudex short: lvs. ovate or obovate, base cordate or only emarginate, apex acuminate, upper surface green with minute white dots, lower pale black-dotted; petiole about as long as blade. Borneo. Var. **álbo-maculàta,** Engler (*S. crispàta,* Hook.), has the upper surface of the lvs. silvery with the exception of the midnerve, the lateral nerves, and the margins, which are green. Borneo. B.M. 6576.

BBB. *Blade ovate-oblong or its outline more or less triangular and cordate or rarely cordate-ovate, sometimes varying in the same specimen.*

C. *Adult st.-blades oblong-ovate, base distinctly cordate; blade ashy-maculate.*

neoguineénsis, N. E. Br. (*S. novoguinénsis,* Engler. *S. variegàta,* Hort., not Hook.). Lvs. ovate-cordate, bright green, irregularly blotched with pale yellowish green, the total mass of green being greater than the variegation; petiole 9–12 in. long; blade 8–9 x 5–5¾ in. New Guinea. I.H. 27:380 (as *Colocasia neoguineensis,* the variegation being a bright creamy white).

CC. *Adult st.-blades thin, broadly ovate-cordate, white or palely ashy-maculate.*

picta, Schott. Lvs. ovate-cordate, the basal lobes [illegible] nus deep, dark green above, marked [illegible] aucous spots at the middle, on each [illegible], and between the nerves; petiole 8–16 [illegible]-7 in. long. Java.

BB. [illegible]*oadly ovate-cordate, slightly longer than d, posterior lobes semi-ovate.*

latifòlia, Miq. (*S. rupéstris,* Zoll. & Mor.). Caudex thick, above ground: lvs. ovate, acute, deeply cordate, 6–18 x 6–12 in., upper surface dull green, lower paler, posterior lobes semi-ovate, sinus acute; petiole usually longer than the blade. Java, Celebes, and the Philippines.

S. oblongifòlia var. *Cùrtisii,* Hort., is offered in the trade but is apparently not known botanically.—*S. Roebelinii,* Pitcher & Manda, 1895, p. 138. "Lvs. beautifully marked with silvery white in a broad feathery variegation. Only the center and edge of the lvs. are plain light green. The plant is compact, free-growing, with thick lvs. as enduring as those of a rubber tree. A fine house plant." This plant is imperfectly known. It is figured in Pitcher & Manda's catalogue for 1895:141 as S. Roebelinii, and the same is used in A.G. 19:589 (1898) as S. picta and in V. 23:71 (1899) as S. crispata. The plant so pictured is distinct from any species described above. There is more white than green in the lf., only the edges and midrib portion being green. Some growers think it to be a sport of S. asperata var. albo-maculata.—*S. Seèmanii,* Hort. Bull, was advertised by the U. S. Nursery Co. 1895, but seems unknown to botanists.—*S. siaménsis,* Hort. Bull, imperfectly known to botany. Possibly a species of Aglaonema.

F. TRACY HUBBARD.†

SCHÍSMUS (Greek, *schisma,* a cleft, referring to the 2-lobed lemma). *Gramíneæ.* Low annuals with short dense panicles of pale shining spikelets. Species 4, Medit. region and Afr. *S. calýcinus,* Coss., has recently been intro., but is of no horticultural importance.

A. S. HITCHCOCK.

SCHIZÆA (Greek, *to split*). *Schizæàceæ.* A group of small ferns with twisted grass-like lvs. and sedge-like sporophylls formed of a cluster of closely compacted pinnæ, each with 2 rows of sporangia, which in common with the family are pear-shaped, with an apical ring, opening by a vertical fissure.

pusílla, Pursh. Our only native species, growing in sand at the edges of bogs, mainly in N. J. Lvs. 1 in. long, grass-like, twisted sporophylls 2–3 in. long, with the apex expanded and consisting of 6–8 closely compacted divisions. Known locally as curly-grass. The prothallus resembles the protonema of a moss, being filamentous rather than thallose as in ordinary ferns.

L. M. UNDERWOOD.

SCHIZÁNDRA (Greek, *schizein,* to cleave, and *aner, andros,* man, stamen, referring to the cleft or separate anther-cells). Including *Sphæróstema* and *Maximowíczia. Magnoliàceæ.* Ornamental vines grown chiefly for their handsome bright green foliage and the scarlet or orange-red berry-like fruits.

Deciduous twining shrubs: lvs. alternate, long-petioled, entire or denticulate, exstipulate: fls. slender-stalked, in few-fld. axillary clusters, diœcious or monœcious; sepals and petals 9–12, not differing; stamens 5–15, more or less connate: carpels numerous, imbricated in the fl., developing into berries disposed on the elongated filiform receptacle, forming a drooping raceme.—Ten or 12 species in E. Asia from N. China and Japan to the Malay Archipelago and one species in N. Amer. The frs. of the Asiatic species are eaten in their native countries.

These are handsome vines mostly twining to the height of 10 to 20 feet, with bright green medium-sized, generally ovate or elliptic, slender-stalked leaves and with axillary long-stalked usually cup-shaped white or red flowers followed by showy scarlet or red, rarely black, berry-like fruits forming drooping racemes. *S. chinensis* is hardy North, while the other Chinese species are somewhat tenderer; the native *S. coccinea* can be grown only South. They may be used for covering rocks, trees, shrubs, or fences, and seem to thrive best in partly shaded and somewhat moist places in a porous, sandy loam. To enjoy the very showy fruit which ripens at the end of August or in September, both sexes must be planted together, as most species are diœcious. Propagation is by seeds, by greenwood cuttings under glass, root-cuttings or layers, and also by suckers.

coccínea, Michx. High-climbing shrub: lvs. slender-petioled, ovate or oval, acuminate, entire or obscurely denticulate, glabrous, 2–3½ in. long: fls. monœcious, crimson-purplish, ⅓–½in. across; stamens 5, connate into a 5-lobed disk with the anther-cells widely separated: berries scarlet, forming a loose raceme 2–3 in. long. June. S. C. to E. Texas. B.M. 1413.

chinénsis, Baill. (*Maximowiczia sinénsis,* Rupr.). Climbing to 25 ft.: lvs. broadly oval or ovate, acute or acuminate, remotely denticulate, dark green and shining above, glabrous except at the veins beneath, 2–4 in. long; petiole ½–1½ in. long: fls. diœcious, pinkish white, ½in. across, fragrant; stamens 5, divided at the apex: berries scarlet, forming a rather dense raceme 1–4 in. long. May, June. Japan, N. China, Amurland. Gt. 12:382. F.S. 15:1594. Gn. 6, p. 583. M.D.G. 1899:568. G.C. III. 50:2. Var. **rùbra,** Hort., is probably *S. rubriflora* (see below).

S. glaucéscens, Diels. Similar to S. chinensis: lvs. oval to elliptic, denticulate, glaucescent beneath: fls. orange-red: fr. scarlet. Cent. China.—*S. grandiflòra,* Hook. f. & Thoms. Lvs. elliptic, denticulate: fls. carmine or pink, 1 in. across: fr. red. Himalayas, W. China.—*S. Hènryi,* Clarke. Branches winged: lvs. broadly ovate to elliptic-ovate, glaucescent beneath: fls. creamy yellow, on pedicels 2–3 in. long. Cent. China. G.C. III. 38:162.—*S. nigra,* Maxim. Similar to S. chinensis: lvs. smaller, quite glabrous: fls. white: fr. bluish black. Japan. Seems more tender than S. chinensis.—*S. propínqua,* Hook. f. & Thoms. (Sphærostema propinquum, Blume). Lvs. ovate to ovate-lanceolate, about 4 in. long on ½in.-long petioles: fls. pale yellowish: fr. scarlet, forming racemes to 6 in. long Himalayas. B.M. 4614. For cult. in subtropical regions or in the warm greenhouse. Var. *sinénsis,* Oliver. Lvs. oblong to lanceolate, remotely dentate. Cent. and W. China.—*S. pubéscens,* Hemsl. & Wilson. Lvs. broadly elliptic to ovate, remotely denticulate, pubescent beneath, 3–4 in. long: fr. red and orange in racemes about 4 in. long. Cent. China.—*S. rubriflòra,* Rehd. & Wilson. Lvs. obovate to oblong-obovate, denticulate: fls. dark red, about 1 in. across: fr. crimson, in long racemes. W. China.—*S. sphenan-*

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thèra, Rehd. & Wilson. Similar to S. chinensis: lvs. obovate or elliptic, glabrous: fls. orange-red, ¾in. across; stamens many: fr. scarlet. Cent. and W. China. Var. *lancifòlia*, Rehd. & Wilson. Lvs. lanceolate, minutely denticulate: fls. smaller. W. China.

ALFRED REHDER.

SCHIZÁNTHUS (Greek, *split* and *flower;* from the incised corolla). *Solanàceæ.* BUTTERFLY FLOWER. Erect half-hardy annual herbs, more or less glandular-viscid, grown outdoors and also in the greenhouse for bloom. They can be trained into immense pot subjects.

Leaves frequently pinnatisect, the segms. incised or dentate: cymes terminal and open: fls. incised, showy and variously colored; calyx deeply 5-cleft, almost 5-parted, the lobes linear; corolla-tube short or elongated, cylindrical, the limb spreading, oblique, somewhat 2-lipped, laciniate; perfect stamens 2, exserted; disk inconspicuous; ovary oblong, 2-celled: caps. membranaceous-chartaceous; seeds numerous.—About 7 species, all from Chile. These choice plants are of easy cult. in any good garden soil. They are also useful as pot-plants for spring flowering, the seed being sown in early fall and the plants kept in a light house and given plenty of root-room as they need it. There is a strain offered in trade under the name of *S. hybridus*, Hort., which is not readily placed botanically. It does not appear to be specific in rank and apparently consists of a series of large-fld. garden hybrids. It is offered in several variations.

A. *Corolla-tube as long as the calyx; stamens short-exserted.*

B. *Middle segm. of the anterior lip of the corolla notched at summit.*

retùsus, Hook. St. 2 ft. high: lvs. pinnatisect, with the segms. entire, dentate, or pinnatifid: fls. in the type deep rose, with the large middle segm. of the upper lip orange except at the tip; the lateral segms. of the posterior lip falcate, acute, linear, longer than the middle segm. B.M. 3045. B.R. 1544. G. 5:361; 23:35. G.M. 51:416. H.F. 1:136. Var. **álbo-maculàtus,** Hort., is a form with white-spotted fls. Var. **álbus,** Hort., has the fls. white with the middle segm. of the upper lip suffused with yellow. Gn. W. 17:458. Var. **lilácinus,** Hort., has lilac fls. Var. **nànus,** Hort., a dwarf form, is offered in the trade. Var. **trimaculàtus,** Hort. (*S. trimaculàtus*, Hort.), has the fls. purple-crimson with 3 distinct golden yellow spots bordered with bright purple. R.B. 32, p. 61.

BB. *Middle segm. of the anterior lip not notched at apex.*

Gràhamii, Gill. Lvs. 1–2-pinnatisect; segms. entire or dentately pinnatifid: fls. typically lilac or rose, with the middle half of the middle segm. of the anterior lip yellow or orange; the lateral segms. of the posterior lip falcate, linear, acute, shorter than the middle segm. B.M. 3044. R.H. 1843:529. H.F. 1:136. Var. **álbus,** Hort., has white fls. Var. **carmíneus,** Hort., has carmine fls. Var. **cárneus,** Hort., is offered in the trade and has flesh-colored fls. Var. **lilácinus,** Hort., has lilac fls. Var. **níveus,** Hort., has pure white fls. Var. **ròseus,** Hort., has rose-colored fls.

AA. *Corolla-tube shorter than the calyx; stamens long-exserted (not noticeably so in S. wisetonensis).*

wisetonénsis, Hort. (*S. pinnatus* × *S. Grahamii*). Apparently intermediate between the two parents, the fl. resembling that of the latter parent in outline, the corolla-tube seemingly shorter than the calyx, the stamens usually rather short-exserted, the fls. vary in color from white through bluish and pink to carmine-brown, the midlobe of upper lip often suffused with yellow. A hybrid of garden origin now very generally cult. G. 25:161; 28:225; 33:351. G.M. 43:332; 53:164. Gn.M. 13:76. Gt. 53, p. 326; 54:1544. G.W. 6, pp. 38, 39. J.H. III. 64:321. R.B. 27:169. C.L.A. 19:166. F.E. 23:646. Var. **compácta,** Hort., is only a more compact form than the type.

pinnàtus, Ruiz & Pav. (*S. pórrigens*, Graham. *S. Prìestii*, Paxt.). Fig. 3569. The most variable of the species, with many horticultural forms distinguished by height of st. and color-markings of the fls. Typically 2 ft. high: lvs. 1–2-pinnatisect; the segms. entire, dentate or incisely pinnatifid: fls. varying in depth of color, the lower lip usually violet or lilac; the upper paler, its middle section with a yellow blotch at its base and spotted with purple or violet. B.M. 2404; 2521. B.R. 725; 1562 (as var. *humilis*). Gng. 12:613. G.W. 3, p. 497.—The plant known horticulturally and in trade-lists as *S. grandiflòrus*, Hort., and variations, undoubtedly belongs here.

3569. Schizanthus pinnatus. (×½)

Var. **álbus,** Hort. (*S. grandiflòrus álbus*, Hort.), has fls. slightly larger than the type, white or yellowish. Var. **candidíssimus,** Hort., has pure white fls. Var. **compáctus,** Hort., is a compact form similar to var. *nanus*, and offered in several forms in the trade. Var. **lilácinus,** Hort., has lilac fls. Var. **nànus,** Hort., is dwarfer than the type, offered in several colors in the trade. Var. **níveus,** Hort., has pure white fls. Var. **oculàtus,** Hort. (*S. grandiflòrus oculàtus*, Hort.), has a purplish black blotch surrounded with yellow at the base of the middle segm. of the upper lip or with the typical yellow portion dotted with small dark purple spots. B.H. 1862:451. H.F. II. 2:264. Var. **papilionàceus,** Hort., has a central coloring somewhat as var. *oculatus*, with the general color of the fl. marbled in various shades. Var. **ròseus,** Hort., has rose-colored fls. Var. **tigridioìdes,** Hort., is also cult.

F. TRACY HUBBARD.†

SCHIZOCÁPSA (Greek, *cut* and *capsule* or *fruit*). *Taccàceæ.* Perennial herbs: root tuberous: lvs. radical, entire, nerved: scape undivided, the fls. umbellate, pedicelled; perigonium-tube connate with the ovary, the limb superior, 6-parted, unequal, finally deciduous; stamens 6; ovary 1-celled with 3 parietal placentæ: caps. 1-celled, dehiscent along the angles into 3 valves which are soon recurved. One species, China, *S. plantagínea*, Hance. Plant entirely glabrous: lvs. rather broad, lanceolate, entire, acute, 8–9 in. long, gradually narrowed to a short basally sheathing petiole: infl. umbellate, 15–20-fld.: fls. angled-pedicelled, yellowish green: caps. trigonous, vertically convex-complanate. China. G.W. 4, p. 169.

SCHIZOCÉNTRON (Greek for *split* and *thorn*). *Melastomàceæ.* A monotypic genus, the species being **S. élegans,** Meissn. (*Heèria élegans*, Schlecht. *Heèria procúmbens*, Naudin. *Heterocéntron élegans*, O. Kuntze). A low creeping vine-like plant forming a dense carpet, rooting at the joints: branches terete or nearly so, reddish, somewhat appressed-pubescent: lvs. ovate, distinctly petioled, obtuse: fls. solitary and terminal on slender peduncles, less than 1 in. long; corolla a deep

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purple, nearly 1 in. broad: fr. very hairy, producing seed freely by which the plant is readily prop. (or by cutting). Vera Cruz, Mex. G.C. III. 42:293. Gt. 62, p. 275. This species, although first described in 1839, has not been in cult. until since its rediscovery in 1901 at Jalapa by J. N. Rose. It is a very dainty plant, well worthy of ornamental cult. It is grown to some extent in Mexican gardens at an elevation of about 3,000 ft., where it does unusually well, growing apparently as well in shade as in the bright sunlight. The plant has been grown for a number of years in the N. Y. Botanical Garden, and when in full flower makes a most striking display. It forms a dense mat and is well suited for close carpet-bedding.

J. N. Rose.

SCHIZOCÒDON (Greek *cut* and *bell*, referring to the fringed corolla). *Diapensiàceæ*. Glabrous herbs, with the caudex perennial and scale-bearing between lvs., suitable for outdoor planting: lvs. all radical, long-petioled, ovate-rotund, base cordate, crenulate-undulate, leathery and persistent: fls. few at the top of the scape, racemose, subsecund, nodding, 1–2-bracted; calyx 5-parted, the segms. linear-oblong, striate-nerved; corolla

3570. Schizocodon soldanelloides. (×½)

funnelform, 5-lobed, the lobes truncate, fimbriate, and imbricate; stamens 5; ovary ovoid-globose, 3-celled: caps. globose, 3-angled.—Perhaps 4 species, Japan. *S. soldanelloides* is a pretty alpine plant or boreal with rosy fls. fringed like the well-known soldanellas of the Alps. It may be readily distinguished from Soldanella (which is a member of the primrose family) by the lvs. being toothed, and the stamens 4 instead of 5. The name "fringed soldanella" has been proposed for schizocodon, but all soldanellas are fringed. "Fringed galax" would be better, as galax is the nearest relative, schizocodon being, in fact, the Japanese representative of the American galax. The lvs. of schizocodon are sometimes more or less bronzy, like those of galax, but their form is not so pleasing. The plant is only a few inches high, and the fls. are borne to the number of 4–6 on a scape. The scapes are numerous and the fls. about 1 in. across. Since 1892 this plant has excited an amount of interest comparable to that caused by the intro. of shortia, in 1889.

soldanelloìdes, Sieb. & Zucc. Fringed Galax. Fig. 3570. Hardy, tufted, alpine plant a few inches high: lvs. leathery, evergreen, long-stalked, the blade roundish, wedge-shaped or subcordate at the base, coarsely toothed, the teeth apiculate: fls. nodding; sepals 5, oblong, obtuse; corolla deep rose in center passing into blush or white at the edges; staminodes linear. Japan. B.M. 7316. Gn. 44:418. G.C. III. 13:415; 51:348. G.M. 36:206. J.H. III. 34:323; 44:347. V. 20:119.—This is probably the only species in the genus, as *S. uniflorus* is Shortia and *S. ilicifolius* is thought to be a variety of *S. soldanelloides*, with more variable lvs. and fls. ranging from red to white. Offered by many European dealers, and by one or two Americans; little known here.

F. Tracy Hubbard.†

SCHIZOLÒBIUM (Greek, *to cleave* and *pod*, alluding to the manner of dehiscence). *Leguminòsæ*. Tall trees adapted to the warmhouse and planted outdoors in the extreme South: lvs. large, bipinnate; lfts. numerous, small: fls. in axillary racemes or in panicles at the ends of the branches; calyx-tube disk-bearing, oblique, turbinate, the segms. slightly unequal, reflexed; petals 5, clawed, ovate or rotundate, slightly unequal; stamens 10, free; ovary scarcely stipitate: legume compressed, obovate, 2-valved, 1-seeded.—One, possibly 2, species. Brazil and Panama.

excélsum, Vog. A tree reaching a height of 120 ft. in its native habitat: lvs. fern-like, with 18 pairs of lfts. which are about 2 in. long and 20-jugate, oblong, very short-petiolulate, white beneath and golden pilose on the midnerve: fls. yellow, in large panicles. Brazil. R.H. 1874, p. 113.—Intro. into S. Fla. and S. Calif.

F. Tracy Hubbard.

SCHIZONÒTUS: *Holodiscus.*

SCHIZOPÉTALON (Greek, *cut* and *petals*, alluding to the cut petals). *Cruciferæ*. Half-hardy erect annual herbs used in border planting: lvs. alternate, sinuate, dentate or pinnatifid: fls. purple or white, in terminal, leafy-bracted racemes; sepals erect; petals clawed, pinnate-lobed, involute: silique narrowly linear, knotty; seeds many.—About 10 species, S. Amer.

S. Wálkeri, Sims. St. weak, assurgent: lower lvs. 4–5 in. long, sinuate-pinnatifid, elongate-oblong in outline, long-attenuate at base, scabrous on both surfaces, distant: peduncles solitary, axillary, but collected at the top into a raceme: fls. white; calyx cylindrical; petals spreading, ovate, incise-pinnatifid. Chile. B.M. 2379. G. 24:240.

SCHIZOPHRÁGMA (Greek, *schizein*, to cleave, and *phragma*, wall; the inner layer of the wall of the valves is cleft into fascicled fibers). *Saxifragàceæ*. Ornamental vines grown for their handsome bright green foliage and their showy clusters of white flowers.

Shrubs climbing by aërial rootlets: lvs. opposite, long-petioled, dentate or entire: fls. in loose cymes; sepals and petals 4–5; stamens 10; style 1; ovary 4–5-loculed; marginal sterile fls. consist only of 1 large white sepal, terminating the branchlets of the infl.: fr. a small, 10-ribbed caps.—One species in Japan and another in China, allied to Hydrangea and Decumaria.

These are handsome woody vines with rather large bright green foliage and loose terminal cymes of small white flowers with large and showy sterile ones at the margin. They are well adapted for covering walls and trunks of trees and cling firmly by means of aërial rootlets. The Japanese species is hardy as far north as New York City, while the Chinese one is tenderer. They thrive best in rich, moderately moist soil and partial shade, but also do well in full sun if the soil is not too dry. Propagation is by seeds or greenwood cuttings under glass; also by layers.

hydrangeoìdes, Sieb. & Zucc. Climbing to 30 ft. and more: lvs. on reddish petioles 2–3 in. long, orbicular or broadly ovate, shortly acuminate, rounded or cordate at the base, remotely and coarsely dentate, bright green above, pale beneath, almost glabrous, 2–4 in. long: cymes peduncled, 8 in. broad; marginal fls. pedicelled, consisting of an oval to broadly ovate white

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sepal about 1½ in. long. July. Japan. S.Z. 1:26, 100. Gn. 15, p. 301; 34, p. 281. R.H. 1881, p. 313, fig. 72. B.M. 8520.—The species is often confounded with *Hydrangea petiolaris*, which is easily distinguished by its marginal fls. having 4 sepals. Like *Hydrangea petiolaris*, young plants produce small lvs. and make little growth if unsupported and allowed to trail on the ground. It has been once intro. under the name *Cornidia integerrima*, which is a Chilian plant with entire evergreen lvs.

integrifòlium, Oliver (*S. hydrangeoìdes* var. *integrifòlium*, Franch.). Climbing to about 12 ft.: lvs. ovate or broadly ovate, acuminate, truncate or subcordate at the base, entire or sparingly denticulate, usually pubescent on the veins beneath, of thickish texture, 4–6 in. long: cymes to 10 in. broad; the sepals of the sterile fls. ovate to ovate-oblong, 1½–2½ in. long. July. W. China. H.I. 20:1934. J.H.S. 28, p. 62. Var. **mòlle**, Rehd. Petioles and lvs. beneath densely soft-pubescent: sterile sepals 2–3 in. long. W. China. Var. **denticulàtum**, Rehd. Lvs. thinner, broadly ovate to oblong-ovate, minutely or sinuately denticulate, pubescent on the veins beneath: sterile sepals usually ovate-oblong, broadly cuneate at the base, 1½–2¼ in. long. Cent. China.—This species is showier than the preceding on account of the larger sterile sepals, but is less hardy. ALFRED REHDER.

SCHIZÓSTYLIS (Greek, *to cut*, and *style*, alluding to the filiform segments of the style). *Iridàceæ*. Greenhouse or half-hardy plants: sts. fascicled on the rhizome, bulbless or slightly bulbous-thickened at the base: lvs. linear or narrow-ensiform: spathes remote along the simple peduncle, somewhat distichous, greenish, lanceolate, complicate: fl. sessile in the spathe; bracts narrower than the spathe, green or somewhat scarious, 2-keeled; perianth showy, red, the tube slender, the lobes equal, oblong or ovate; ovary 3-celled: caps. obovoid or oblong, the top truncate, 3-grooved, membranaceous.—Two species, S. Afr.

coccínea, Backh. & Harv. CRIMSON FLAG. A winter-blooming tender plant: st. 1–2 ft. high, bearing 2–3 lvs.: basal lvs. 2–3, about 1½ ft. long: fls. bright red, about 2 in. across. B.M. 5422. F.S. 16:1637. G.L. 24:208. J.H. III. 48:539.—The following cultural notes are taken from Garden and Forest 9:16: "The species blooms from Oct. to late Dec. and is useful for cut-flowers at this season. It is perfectly hardy in England but of little use here except for indoor use. The roots should be planted out in rich soil in spring about 8 in. apart, and encouraged to make a strong growth. In the fall the plants may be lifted, potted and placed in a cool greenhouse, where they will flower. After flowering they may be stored in a frame until spring, when the fleshy roots will need to be separated (leaving 3–5 buds to each root), and planted out as before." F. TRACY HUBBARD.†

SCHLEICHÈRA (named for J. C. Schleicher, a Swiss botanist). *Sapindàceæ*. Tree of some economic value and hardy in the far south of the U. S.: lvs. alternate, not stipulate, pinnate; lfts. opposite (or alternate), entire, repand-wavy or slightly serrate: infl. simple elongated panicles or racemes: fls. small, fascicled, regular, polygamously dicœcious; calyx 4–6-cut, small, cup-shaped; petals lacking; disk complete, glabrous, wavy; stamens 5–8; ovary 3–4-celled: fr. dry-crustaceous-coriaceous. One species, Asia. **S. trijuga**, Willd. A large tree: lvs. paripinnate, 8–16 in. long; lfts. 4–8, opposite, 1–10 x ⅔–4¼ in., elliptic or elliptic-oblong, obtuse or short-acuminate, entire, sessile or subsessile: racemes axillary: fls. yellowish or green: fr. ¾–1 in. long, ellipsoidal, glabrous, apiculate, smooth or spiny. Himalaya region, south through India, Ceylon, Burma, to Java and Timor. Intro. into Calif.—The timber is good, the bark is astringent and when mixed with oil is used by the natives to cure the itch, the oil of the seed is of economic use, and the subacid pulpy aril is edible. F. TRACY HUBBARD.

SCHLÍMMIA (named in honor of M. Schlim). *Orchidàceæ*. Epiphytic herbs, with oblong somewhat spindle-shaped 1-lvd. pseudobulbs, suitable for the warmhouse with cattleyas and the like: lvs. leathery, contracted to the petiole: scapes erect or recurved from between the pseudobulbs, simple, few-sheathed: fls. rather large, fleshy, ivory-white, few in a lax raceme, short-pedicelled; sepals, the dorsal free, narrow, concave-keeled, the lateral very broad, connate with the foot of the column, forming a helmet-like sac; petals narrower than the dorsal sepal, spreading at their tip; labellum variously lobed, the apex reclining on the foot of the column; pollinia 2.—Three species from the Colombian Andes. *S. jasminodòra*, Planch. & Lind. Pseudobulbs long and slender: lvs. oval, long-petioled: scape about 1 ft. high bearing 3 secund fls.; fls. white and very fragrant; dorsal sepal linear erect; petals reflexed; labellum fleshy, shorter than the column. Colombia. *S. trífida*, Reichb. f. Pseudobulbs elongate-ovate, clustered: lvs. oblong, acute: scape lateral, drooping, deep purple, bearing a 1-sided raceme of about 4 fls.: fls. fragrant; dorsal sepal turned downward, lateral waxy white with a few purple spots inside; petals linear, acute, bent outward; labellum trifid at the apex, white, marked with rich orange. Colombia. G.C. II. 7:141. F. TRACY HUBBARD.

SCHLUMBERGÈRA (named for Friedrich Schlumberger). *Cactàceæ*. Similar to Zygocactus in habit, but with regular fls. and angled fr. Schumann referred some of the species to Phyllocactus (Epiphyllum), but such a reference can hardly be entertained. The genus seems to be confined to Brazil, but little is known about it in a wild condition. Its treatment should be the same as zygocactus (the old Epiphyllum). Two well-known species are in cult.

Russelliàna, Brit. & Rose (*Epiphýllum Russelliànum*, Hook.). Sts. more upright, with pendent branches: joints ¾–1½ in. long by ⅜–¾ in. broad, oblong or elliptical to obovate, light green; margins crenate, with 2–4 areoles on either side, bearing a few very short dark gray bristles: fls. from the end of the youngest joints, red, 1¾–2¼ in. long: fr. red, 4-angled or narrow-winged. Brazil. B.M. 3717.

Gærtneri, Brit. & Rose (*Epiphýllum Gærtneri*, Schum. *E. Russelliànum* var. *Gærtneri*, Reg.). EASTER CACTUS. Sts. of more upright habit, with drooping branches: joints long-oblong or elliptical to obovate, ⅝–2¼ in. long by ½–1 in. broad, dark green, margins crenate, with about 5 areoles on either side, bearing 6–12 rather stiff, long, yellow or brown bristles, which are especially conspicuous on the truncated apex, where they form a considerable beard: fls. from the apex of the youngest joints, 2½–3 in. long, scarlet-red: fr. red. Brazil. B.M. 7201. J. N. ROSE.

SCHŒNIA (named in honor of Dr. Schœn). *Compósitæ*. An annual, adapted to the greenhouse in the N. and outdoors in the S.: lvs. alternate or the lower ones opposite, entire: fl.-heads in a loose corymb: involucre turbinate or campanulate; outer bracts scarious, imbricate, inner row petal-like; receptacle without scales; florets all tubular, 5-toothed; those of the circumference fertile, the disk-florets sterile.—One species, Austral. *S. Cassiniàna*, Steetz. An erect corymbosely branched annual, 1–2 ft. high: lvs. lanceolate or linear, or the lower oblong-spatulate: fl.-heads in a loose terminal corymb: outer bracts of involucre brown, the radiating laminæ of the inner white or pink, oblong: achenes in a single row at the circumference. Austral. J.H. III. 47:7.

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SCHOMBOLÆLIA (compounded from *Schomburgkia* and *Lælia*). *Orchidàceæ*. A generic name to designate the hybrids between Schomburgkia and Lælia. *S. tibibròsa*=S. tibicinis × L. tenebrosa.

SCHOMBOLÆLIOCÁTTLEYA (compounded from the names *Schomburgkia* and *Lælioattleya*). *Orchidàceæ*. A name to comprise the hybrids between Schomburgkia and Læliocattleya. *S. schœnbrunnénsis*=S. rosea × Lc. Lucia.

SCHOMBÚRGKIA (named for Dr. Schomburgk, naturalist and geographer, who explored British Guiana). *Orchidàceæ*. Orchids with the habit of cattleyas or lælias, except that they are less compact.

Pseudobulbs long, fusiform, bearing several brown scales and 2–3 leathery lvs. at the summit: fl.-sts. from the top of the pseudobulbs, sometimes very long, bearing a terminal raceme or panicle of showy fls.: fls. like those of Lælia except that the sepals and petals are narrow and undulate and the labellum does not completely envelop the column; labellum always evidently 3-lobed.—About 15 species, in Trop. Amer.

3571. Schomburgkia tibicinis. (×⅛)

Give schomburgkias plenty of heat and a light place near the glass, which should be slightly shaded during the hot summer months. Provide freely of water in the growing season. Rest them in a temperature of 55°. *S. tibicinis* and *S. Lyonsii* are to be classed amongst the showy easily grown orchids resembling lælias. (Wm. Mathews.)

tibícinis, Batem. (*Epidéndrum tibícinis*, Batem.). Fig. 3571. Pseudobulbs 1–1½ ft. long, tapering upward: lvs. 2–3, oblong, leathery: raceme 4–8 ft. high, bearing numerous fls. each 3½ in. across; sepals and petals oblong, undulate, crisp; lateral lobes of the labellum large, cucullate, middle lobe small, emarginate; fls. deep pink, speckled with white on the outside, rich chocolate-red within; labellum white within, deep rose-color at the sides, with a short chocolate-red middle lobe. Summer. Honduras, Cuba. G.C. III. 4:212; 9:651. Var. **grandiflòra,** Lindl. Fls. larger and paler, with more yellow in the lip. B.R. 31:30. B.M. 4476. F.S. 1:54.—*S. tibicinis* requires less compost than the other species.

Lyonsii, Lindl. Pseudobulbs about 1 ft. high, with 2–3 linear-oblong lvs. at the top: racemes erect, 9 in. long, bearing 12–25 fls., each subtended by a reflexed bract about 3 in. long; fls. 2 in. across; sepals and petals ovate to ovate-lanceolate, undulate, white with several rows of purple spots; labellum larger, recurved, acute, white, with a yellowish brown crisp margin; anther 2-horned. Aug. Jamaica. B.M. 5172. F.S. 20:2130. G.C. III. 26:203.

rósea, Lind. Related to *S. undulata*. Bracts, peduncles and labellum light rose: sepals and petals oblong, undulate, narrower than the labellum; labellum with rotund lateral lobes and a smaller subrotund middle lobe, margin crisp. Colombia.

crispa, Lindl. Pseudobulbs numerous, long: lvs. oblong-lanceolate: fls. yellowish brown; sepals and petals oblong, undulate; labellum ovate-oblong, obscurely 3-lobed. Guiana. B.R. 30:23. B.M. 3729 (as *S. marginata* var.).

undulàta, Lindl. Fls. in a dense raceme; sepals and petals linear, undulate, crisp, longer than the labellum, rich brownish purple; labellum cucullate, middle lobe oval, acute or obtuse, violet-purple. Jan. Colombia. B.R. 31:53.

S. Lueddemánii, Prill. Fls. brown, with the lip and column purple, and the crest and anther yellow; sepals and petals linear-oblong, obtuse, manifestly undulate, 1½–1¾ in. long; lip 3-lobed, ¾in. long, the middle lobe ovate-orbicular, apiculate, about ¼in. long, the edges incurved near apex. Venezuela. B.M. 8427.—*S. Sanderiàna*, Rolfe. Fls. rose-carmine; sepals lanceolate-oblong, 1½ in. long; petals oblanceolate-oblong; lip obscurely 3-lobed, 1½ in. long, the front lobe broadly rounded obtuse, crisped-undulate. Origin unknown. J.H. III. 51:383.—*S. Thomsoniàna*, Reichb. f. Sepals and petals linear-oblong, 1½ in. long, cream-white passing to yellow at apex, the sepals undulate, the petals crisped; lip 3-lobed, the middle lobe oblong, emarginate, much crisped, deep purple, with a yellow disk. Cayman Isls. B.M. 7815.—*S. Wéllisii*, Reichb. f. Resembling S. Lueddemanii. Lip with broad obtuse side lobes, and very acute front lobe, all brown at apex.

GEORGE V. NASH.†

SCHOMBURGKIOCÁTTLEYA (compounded from *Schomburgkia* and *Cattleya*). *Orchidàceæ*. A genus established to contain the hybrids between Schomburgkia and Cattleya. *S. spirális*=S. tibicinis × C. Mossiæ.

SCHÒTIA (named for Richard Schot, companion of Jacquin during his travels in America, 1754–1759). *Leguminòsæ*. Small trees or unarmed shrubs, suitable for greenhouse-growing.

Leaves odd-pinnate; lfts. leathery, or small; stipules short: fls. red, showy, clustered in short panicles; bracts and bracteoles ovate or oblong, caducous; calyx-tube disk-bearing, turbinate, short or the base long-attenuate, segms. 4, strongly imbricated; petals 5, slightly unequal, subsessile, imbricated, either ovate or oblong or minute scale-like; stamens 10, free, or shortly connate at the base; ovary stipitate: legume oblong or broad-linear.—About 6 species, Subtrop. and S. Afr.

A. *Fls. on rather long pedicels.*

B. *Petals longer than the calyx.*

speciòsa, Jacq. A tree or shrub, about 10 ft. high: lvs. variable in form, which fact has led to much separation of this species into varieties and species; lfts. 8–32, linear, oblong, or obovate: fls. crimson, in terminal panicles. S. Afr. B.M. 1153 (as *S. tamarindifolia*).—Intro. in S. Calif.

BB. *Petals shorter than the calyx.*

brachypétala, Sond. A large shrub or small tree: lfts. 8–10, larger than in *S. speciosa*, ovate-oblong or obovate: panicles many-fld., axillary and terminal; calyx-tube conical, crimson; petals very small, linear, hidden by the calyx. S. Afr.—Cult. in S. Fla. and S. Calif.

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aa. *Fls. nearly sessile.*

latifòlia, Jacq. Becoming a tree 20–30 ft. high: lfts. 4–8, ovate-oblong or obovate, usually 1½–2½ in. long, ½–1 in. wide: fls. rosy or flesh-colored, in much-branched panicles; petals longer than the calyx. S. Afr.—Advertised in S. Calif. F. W. Barclay.
F. Tracy Hubbard.†

SCHRÁNKIA (named after F. B. Schrank, a Bavarian botanist); also spelled *Schranckia*. *Leguminòsæ*. Perennial herbs or subshrubs, often prostrate, armed with recurved prickles. The species in common cult. is

3572. Schubertia grandiflora. (×⅓)

an outdoor plant. Lvs. bipinnate, often sensitive, petiole without glands, frequently bristly between the pinnæ; the lfts. small; stipules bristle-like: fls. in globose heads or cylindrical spikes, peduncles solitary or fascicled at the axils, rose or purplish, 5–4-merous, sessile, perfect or polygamous; calyx very minute; petals connate to the middle in a funnelform corolla; stamens numerous, free; ovary subsessile: legume linear, acute or acuminate, both sides aculeate.—About 10 species, all American; one has also been discovered in Trop. Afr. These plants are also known as Morongia, the following species, in that case, taking the name *M. uncinata*, Brit.

uncinàta, Willd. Sensitive Brier. A hardy herbaceous perennial, branched and decumbent, 2–4 ft. long, well armed with short prickles: lvs. very sensitive, with about 6 pinnæ; pinnæ with 16–30 lfts.: fls. pink, in globular heads nearly 1 in. through. May–July. Va. to Ill. and south. B.B. 2:256.
F. Tracy Hubbard.†

SCHREBÈRA (perhaps after J. C. D. Schreber, 1739–1810, physician and naturalist). *Oleàceæ*. Trees with unequally pinnate lvs. and fls. in very much-branched cymes: calyx tubular-bell-shaped, irregularly 4–7-lobed; corolla salver-shaped; tube cylindrical; lobes 4–7, spreading; stamens 2, near the top of the corolla-tube; ovary 2-celled.—About 15 species, Afr. and India. Nathusia, with 4 species at the date of Engler & Prantl, Die Pflanzenfamilien, IV. 2 (1895), is a synonym of this genus.

swieteniòides, Roxbg. (*Nathùsia swieteniòides*, Kuntze). A tree, about 40 ft. high, nearly glabrous: lfts. 5–7, ovate, acute, 4 x 2 in.: fls. white, with brown marks, about ½in. across, in many-fld. cymes. Cult. in S. Fla.

SCHUBÉRTIA (named after Gotthilf Heinrich von Schubert). *Asclepiadàceæ*. Twining shrubs, occasionally grown in the warmhouse: lvs. large: fls. large, white, borne in loose umbels; sepals ovate, generally acute, alternating with single glands; corolla funnelform or salver-shaped, with a broad tube; crown upright, included: follicles thick and hairy.—About 6 species from S. Amer. **S. grandiflòra,** Mart. & Zucc. Fig. 3572. Branches twisting, straw-colored, covered with long rigid red-brown hairs: lvs. cordate, obovate, acute, both surfaces densely brown-pubescent: umbels few-fld.; pedicels long-hairy: fls. white; sepals oval-acute; corolla large, tube gourd-shaped, glabrous inside, the lobes oval-elongate, obtuse, erect, sparsely pale yellow pilose Brazil. G. 36:503; 37:351. Gt. 50:1492. G.F. 3:369 (adapted in Fig. 3572). Gn. 32:84. **S. gravèolens,** Lindl. (*Araùjia gravèolens*, Mast.), is a Brazilian climber, likely to be found in collections of greenhouse plants, smaller-fld. than the above. See p. 2610, under Physianthus. There may be confusion in the use of the names *S. graveolens*, *S. grandiflora*, and *Physianthus auricomus*.

SCIADÓCALYX: *Isoloma*. The following species was not treated under *Isoloma*, see Vol. III, p. 1705. **Isolòma Warszewíczii,** Hort. (*Sciadócalyx Warszewiczii*, Regel. *Kohlèria Warszewiczii*, Hanst.). Perennial herb, 3–4 ft. high, with catkin-like stolons: st., petioles, lvs., and calyx villous-hirsute: lvs. opposite, long-petioled, oval or cordate, crenate: fls. in axillary umbels of 3–6 fls., bright yellow or yellowish green, red- or brown-dotted; calyx adnate to ovary, 5-lobed, lobes almost horizontally spreading; corolla almost oblique at base, tube slightly inflected, limb 5-lobed, lobes rounded; ovary hirsute, surrounded by a glandular, 5-lobed ring. Colombia. B.M. 4843. Gt. 2:256.

SCIADOPHÝLLUM (*shade leaf*, because of the umbrageous foliage). *Araliàceæ*. As understood by Bentham & Hooker in Genera Plantarum, it is a genus of the American tropics, at that time with about 22 known species, differing from Schefflera, among other things, in the calyptrate or coherent rather than free petals and sometimes 4-merous fls. Harms, in Engler & Prantl's Pflanzenfamilien, refers it to Schefflera, and under this name (p. 3108) are here described any species probably now in the trade.

SCIADÓPITYS (Greek, *skias*, *skiados*, umbrella, and *pitys*, spruce, alluding to the position of the leaves). *Pinàceæ*. Umbrella Pine. Ornamental tree grown for its handsome foliage and regular pyramidal habit.

Evergreen resinous tree: lvs. of two kinds; small and scale-like lvs. scattered on the shoot, but crowded at its end and bearing in their axils a whorl of 20–30 long linear flat lvs. furrowed on each side, more deeply beneath; these lvs. really consist each of 2 connate lvs. borne on undeveloped spurs like those of Pinus; they have been sometimes called cladodes, but are not true cladodes: fls. monœcious; the staminate oval, consisting of spirally disposed 2-celled anthers and appearing in dense clusters at the ends of the shoots; the pistillate are solitary at the ends of the shoots and consist of numerous spirally arranged scales subtended by a small bract and bearing 7–9 ovules: cone oblong-ovate, woody, the bracts connate, with the broadly orbicular thick scales spreading at the margin; seeds oval, compressed, with narrow wing, emarginate at the apex.—One species in Japan, with very strong and straight-grained, nearly white wood.

3573. Whorls of foliage of Sciadopitys verticillata. (×⅓)

The umbrella pine is a very handsome tree of narrow

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pyramidal habit, with linear, rather large, needle-like dark green and lustrous leaves in whorls and oval cones 3 to 4 inches long. It is hardy as far north as Portland, Maine, and is of rather slow growth. It thrives well in a moderately and constantly moist, loamy, and also in clayey soil; in dry soil or in soil which periodically becomes dry, it grows poorly. Propagation is by seeds and layers, and sparingly by cuttings of half-ripened wood in summer; but seedlings are to be preferred, as they grow more symmetrically and more vigorously.

verticillàta, Sieb. & Zucc. UMBRELLA PINE. Figs. 3573, 3574. Tree, attaining 100 ft., with ascending branches forming a narrow pyramidal compact head, in old age loose and with pendulous branches: scale-like lvs. dark brown, ⅛in. long: needles 15–35 in each whorl, linear, stiff, obtuse, and emarginate, deeply furrowed on both sides, dark green and glossy above, with a white line beneath, 3–6 in. long: cone 3–5 in. long, ovate-oblong; seed ½in. long; cotyledons 2. Japan. B.M. 8050. S.Z. 2:101, 102. F.S. 14:1485, 1486. Gt. 32, p. 149; 37, p. 437. Mn. 4, p. 154. Gng. 1:25. Gn. 28, pp. 204, 205; 38, p. 499; 71, p. 176; 76, p. 144. G.M. 45:97; 47:272. Gn.W. 11:297. F.E. 21:172, pl. 115. M.D.G. 1906:557. R.H. 1884, pp. 16, 17.—There is a dwarf variety and a form with variegated foliage, both intro. from Japan.

ALFRED REHDER.

3574. Umbrella pine.—Sciadopitys verticillata.

SCÍLLA (the old Greek name used by Hippocrates: *I injure*, according to Miller, alluding to the poisonous bulbs). *Liliàceæ.* SQUILL. WILD HYACINTH. BLUEBELL. Perennial bulbous plants remarkable for easy culture, quick growth and beautiful blue, rose, or white flowers, blooming early in the spring (some in autumn), and therefore desirable plants for the wild-garden, rock-garden, or border; they are very useful in pots for midwinter flowers, for window-boxes and for room-decoration; some are stove plants; some of the South African forms have handsome spotted foliage.

Bulb tunicated, large or small: lvs. radical, 1 to several in number, linear, loriform, lanceolate, oblong or nearly ovate, in *Scilla autumnalis* appearing after the fls.: scape 1 to several, simple, leafless: fls. in racemes, which are several- to many-fld., open, compact or spicate; bracts small, sometimes minute, hyaline: pedicels short or long, sometimes filiform: fls. small or middle-sized (1 in. across), segms. of perianth distinct, perianth blue, porcelain-blue, rose-colored or whitish, open-rotate, cylindric-campanulate, or open-campanulate, segms. persistent for some time; stamens 6, affixed at base or below the middle of the segms.; anthers ovate or oblong, dehiscing longitudinally, introrse; ovary sessile, stigma small, capitate; ovules 2 in each locule, rarely 8–10, ascending: caps. globose; seeds 1–2 in each cell, rarely more; testa black, appressed; embryo small in albumen. —About 80 species, widely distributed in Eu., Asia, and Afr. in temperate districts. The genus is distinguished from Ornithogalum chiefly by the color of the fls. and deciduous perianth, from Hyacinthus by the segms. distinct from the base or very nearly so. Great Britain possesses 3 species of Scilla, *S. verna*, *S. autumnalis*, and *S. nonscripta*, while Germany has, in addition to *S. autumnalis*, 3 others, viz., *S. amœna*, *S. bifolia*, and *S. italica*. For *S. Fraseri*, see *Camassia*.

Among the early flowers there is none more valuable than the scillas. They vary considerably in form of flower and foliage, and although typically they have blue or blue-purple flowers, most, if not all, of the species in cultivation have white and red-purple forms. *S. sibirica* and *S. bifolia* are the earliest to flower, and of these forms the Asia Minor or Taurian kinds are in advance. The form of *S. sibirica* known as *multiflora* is nearly past before the usual type begins to expand. There is also sometimes cultivated in the garden a pleasing white scilla, with hyacinth-like flowers, known to the trade as *S. amœna*. But these white forms are mostly oddities; the effective ones are the blue-flowering kinds. Occasional hybrids between scillas and chionodoxas are met with (see page 749). *Chionoscilla Alleni* is the accepted name for a natural hybrid between *Chionodoxa Luciliæ* and *Scilla bifolia*, first obtained by Mr. Allen, of England, in 1891.

None of the hardy squills requires special culture, and if planted where they can remain undisturbed for a series of years, they seldom disappoint one if the soil is occasionally enriched by top-dressings of manure. The writer has grown them distributed in the grass of the lawn for a number of years with considerable success. The bulbs should be planted as early as possible in autumn. The varieties may be increased by offsets taken after the foliage has matured. For the cool greenhouse or conservatory, many of the scillas are ideal subjects. For this culture, five or six bulbs may be put in a 5-inch pot and the vessel afterward transferred to a coldframe and covered until growth commences. Up to this period very little water will be required, but as the flower-cluster appears the quantity should be increased and the pots transferred to the greenhouse, giving them a position near the glass. The foliage matured, the bulbs may be shaken out of the soil and stored. More attention should be paid to the propagation of the scillas by commercial dealers, for these bulbs should become one of the features of the wild-garden in early spring.

The *Urginea Scilla*, sometimes called *Scilla maritima*, needs to be mentioned in this connection on account of its yielding a medicine for many centuries held in esteem. Almost everyone is familiar with sirup of squills, and has obtained relief from its use in severe colds. The scales of the bulb contain mucilage, sinistrin, sugar, and crystals of calcium oxalate (stated by botanists to ward off snails); the active principles are scillipicrin, scillitoxin, and scillin (the latter producing numbness, vomiting, and the like). Scilla bulbs or roots should never be used unless under proper direction, as in their fresh state they are extremely acrid, and might prove dangerous.

The trade names are considerably confused. Many of the so-called horticultural species and races may be united as mere varieties of species that have been defined botanically. The following names are thought to include all those in the American trade, but other species are known to fanciers.

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KEY TO THE SPECIES.

A. *Shape of fls. campanulate: color blue, blue-lilac, rose-purple, white.*
B. *Pedicels short: bracts linear, in pairs: raceme many-fld.: fls. broadly campanulate, produced from April to June* ..... 1. **nonscripta**
BB. *Pedicels short: bracts in pairs, scarious-hyaline* ..... 2. **puschkinioides**
BBB. *Pedicels long (1–1½ in.): raceme equilateral, compact: fls. cylindric-campanulate, produced in May* ... 3. **hispanica**
AA. *Shape of fls. saucer-shaped to open-rotate.*
B. *Color of fls. rose, size small.*
C. *Size of fls. small, color rose-purple: raceme dense, 30–60-fld.: lvs. linear, fleshy* ..... 4. **numidica**
CC. *Size of fls. very small (⅛in. long): raceme dense: scape slender: bracts whitish, minute* ..... 5. **chinensis**
CCC. *Size of fls. larger (½in. diam.): pedicels long, ascending or spreading: raceme open. July to Sept* ..... 6. **autumnalis**
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C. *Raceme very dense (100–150-fld.), at first conic, then long, compact and broad: scape robust. May.* 7. **peruviana**
CC. *Raceme several- to many-fld., open: fls. mostly distant.*
D. *Lvs. single: raceme about 5-fld.: plant small. May* ..... 8. **monophyllos**
DD. *Lvs. in pairs, cucullate: raceme 3–8-fld., ebracteate: perianth blue, reddish, or whitish. March* ..... 9. **bifolia**
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FFF. *Number of fls. 6–30: raceme at first conic, then open.* 14. **italica**
FFFF. *Number of fls. 20–60: scapes 1–3: bracts minute, linear, white* ..... 15. **japonica**
EEEE. *Foliage linear, thick, channeled: raceme 6–10-fld.: fls. fragrant. April to May.* 16. **verna**

1. **nonscripta,** Hoff. & Link. (*S. nùtans,* Smith. *S. festàlis,* Salisb. *S. cérnua,* Salisb. *Hyacínthus nonscríptus,* Linn.). COMMON BLUE SQUILL. HAREBELL. Lvs. 10–18 in. long, ½in. broad, subacute, concave: scape solitary, tall, stout: raceme 6–15-fld.: bracts in pairs: fls. blue, purple, white, or pink, drooping. April–June. W. Eu., Great Britain. B.M. 1461. Among the garden forms are **álba,** white; **cærùlea,** blue; **lilácina,** lilac-blue; **rósea,** rose- or pink-colored; **cérnua,** nodding.—This is one of the most beautiful of squills, fragrant, thriving best in somewhat shady and sheltered places. Originally placed in the genus Hyacinthus, on account of the general form of the perianth, it was removed to Scilla as having the segms. distinct or nearly so, and is now often considered as forming a distinct genus (Agraphis, Link; Endymion, Dumort.), either alone or with other species which connect it with the other scillas.

2. **puschkinioides,** Regel. Bulb ovate, tunicate: lvs. radical, 2–4, glabrous, broadly linear, obtuse, 2½–3 in. long: scape low, glabrous: pedicels erect, strict, short, base bibracteate; bracteoles scarious, hyaline: perianth campanulate, pale blue, middle nerve deeper blue; base of filaments united; anthers linear-oblong; style filiform. Turkestan.

3. **hispánica,** Mill. (*S. campanulàta,* Ait. *S. pátula,* DC.). SPANISH JACINTH. BELL-FLOWERED SQUILL. Lvs. 5 or 6, glabrous, ascending, lanceolate, ½–1 in. broad, subobtuse, convex at back: scape long: raceme equilateral, compact: fls. cylindric-campanulate; perianth usually blue but often becoming rose-purple, or white; pedicels 1–1½ in. long. May. Spain and Portugal. B.M. 1102. Gn. 78, p. 456; 79, p. 265.—Hardy. Several varieties of it are in the trade under the specific name *campanulata,* viz., **álba,** white; **albomàjor,** large white; **cárnea,** flesh-colored; **hyacinthoides,** hyacinth-like; **rósea,** rose-colored. This species is worthy of wider acquaintance. The bulbs are cheap and easily obtained in autumn, and if planted then they are sure to bloom the following spring.

4. **numídica,** Poir. (*S. parviflòra,* Desf.). Bulb ovoid, 1–2 in. thick: lvs. 4–6, fleshy, herbaceous, linear, 6–8 in. long, 1½–3 lines broad, suberect: scape solitary or paired, ½–1 ft. high: racemes dense, 30–60-fld.: pedicels short, ascending, 3–5 lines long: bracts minute, linear, evanescent: perianth rose-purple, 1½ lines long: single ovule in each of the ovarian cells: caps. small, globose, grooved. Flowering in winter in its native home, Algeria.

3575. Scilla peruviana in full bloom.—Also known as Scilla ciliaris. (×¼)

5. **chinénsis,** Benth. (*Barnárdia scilloìdes,* Lindl.). CHINESE SQUILL. Lvs. 2 or 3, equaling or exceeding the scape, rather hard, acute, channeled: bulb small, ovate: scape erect, slender, or wand-like: raceme spicate, dense, elongated: pedicels short; bracts whitish, minute: perianth rose-colored tipped with green; stigma a mere point. June. China. B.M. 3788.—Half-hardy. A beautiful species with the dense elongated raceme of rose-colored fls., worthy of cult. in any rock-garden.

6. **autumnàlis,** Linn. AUTUMN SQUILL. STARRY HYACINTH. Lvs. several, obtuse, channeled, half-terete, growing on through the winter and dying away in the spring: scapes several: racemes corymbose, spicate, open; perianth rose-colored, ½in. across. July–Sept. Eu. (Great Britain), N. Afr. B.M. 919.—Hardy. The flowering sts. generally precede the lvs. but occasionally the two come up together. As the flowering advances, in most cases a tuft of lvs. similar to those of *S. verna* shoot out by the side of the st. for the following year.

7. **peruviàna,** Linn. (*S. ciliàris,* Hort. *S. Clùsii,* Parl.). CUBAN LILY. PERUVIAN JACINTH. HYACINTH OF PERU (once thought to be a Peruvian plant). Fig. 3575. Bulb large, ovate, tunicate: lvs. many, broad-linear, 6–12 in. long; margins ciliated with minute white

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bristles, channeled: scape robust, terminated by a many-fld. conic broad and compact raceme of purple, lilac, reddish, or whitish fls.: fls. rotate; corolla persistent; anthers short. May, June. Region of Medit., not Peru. B.M. 749. Gn. 27, p. 288. R.H. 1882, p. 508.—The hyacinth of Peru is not hardy in Mass. It propagates freely by offsets. It flowers all through May and

3576. Scilla bifolia. (×⅓)

June and forms a most attractive object in the herbaceous border or bed. *S. peruviana*, however, has one fault that may tell against it in the opinion of many cultivators—it never flowers two years in succession; it seems to need a whole year's rest after the effort of producing its large spike of fls.

8. **monophýllos,** Link (*S. monophýlla*, Plan. *S. pùmila*, Brot.). DWARF SQUILL. Lf. solitary, inclosing the base of the scape, 2 in. long, ½in. broad, involute, ovate-acuminate, with a callous apex, glabrous: scape erect, slender, usually 5–20-fld.: pedicels long, ascending, springing from a small sheathing bract: perianth bright lilac, ½in. across, open, spreading; filaments lilac-blue, dilated at base; anthers erect, blue. May. Spain, Portugal. B.M. 3023.—Hardy.

9. **bifòlia,** Linn. Fig. 3576. Bulb tunicated, oblong-oval: lvs. 2, seldom 3, cucullate, 4–8 in. long, ¼–½in. broad: scape 2–8-fld., ebracteate: fls. stellately rotate; perianth blue, sometimes reddish or whitish; anthers blue, versatile. March. Eu., Asia Minor. B.M. 746.—Hardy. Several varieties of this exquisite little plant are in the trade: **álba,** white-fld.; **rósea,** pink-fld.; **rubérrima,** red-fld.; **spléndens,** intense cobalt-blue fls. Cultivators would do well to obtain all the varieties possible; also as many bulbs of this beautiful species as they can afford. It is one of the most charming of hardy, early spring-flowering plants.

10. **natalénsis,** Planch. Bulb thick, large, ovoid, subglobose: lvs. broadly lanceolate, glabrous, 9–12 in. long, 3–4 in. broad, ascending: scape erect, terete, 1–1½ ft. long: raceme dense, simple, elongated, open, many-fld. (50–100): bracts solitary, subulate: fls. pale blue, stellate, rotate: pedicels long, pale blue. Natal. B.M. 5379. F.S. 10:1043.—Suitable for greenhouse cult. It is a graceful and elegant species, suitable for cult. in pots.

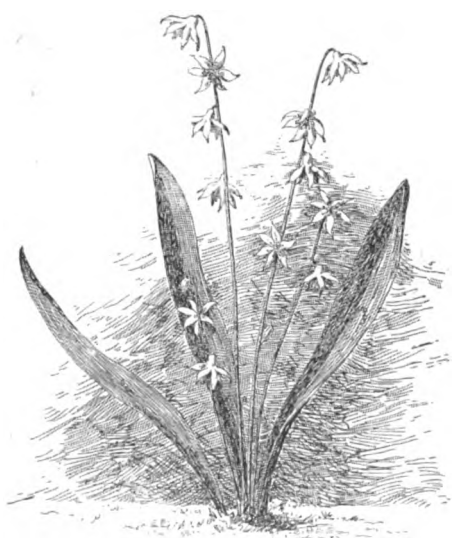
11. **hyacinthoides,** Linn. (*S. parviflòra*, Salisb.). HYACINTH SQUILL. Lvs. 10–12, spreading, 1–1½ ft. long, ½–1¼ in. broad, narrowed at both ends, minutely ciliate-denticulate on the margins: scape straight, long: racemes many-fld., broad, open: pedicels long, 1–1½ in.: bracts whitish, minute, persistent; perianth bluish lilac, open, campanulate. Aug. Medit. region. B.M. 1140.—Hardy. This species is noted for its extreme shyness in flowering. The bulbs are sometimes 2 in. diam., and produce a profusion of offsets. In Fish's Bulb Culture several varieties are mentioned: **cærùlea,** fine blue; **álba,** fine white, free-flowering; **rósea,** distinct flesh-colored; **rùbra,** deep red, large and fine.

12. **sibírica,** Andr. (*S. amæna* var. *præcox*, Don). SIBERIAN SQUILL. Fig. 3577. Lvs. 2–4, ascending, narrow, 4–6 in. long: scapes 1–6, 3–8 in. long: racemes 1–3-fld.; fls. rotate, horizontal or drooping, with short pedicels; perianth deep blue. March. Russia, Asia Minor. B.M. 1025. Gn. 11, p. 165. P.M. 14:100. L.B.C. 2:151.—Hardy. This plant ought always to have a little shelter. It forms attractive tufts and has a desirable habit for rock-gardens. Several trade forms exist, viz., **álba, multiflòra, pállida; amœnula,** dwarfer with brighter blue fls.

13. **amœna,** Linn. STAR HYACINTH. Fig. 3578. Lvs. 4–7, flaccid, ascending, glabrous, 6–9 in. long, ⅓–⅔in. broad: scapes several, equaling the lvs.: racemes several-fld., 4–8, open; fls. distant, ½–¾in. diam., blue: pedicels ascending or spreading. March. Austria, Germany. B.M. 341. G. 37:295.—Hardy. It grows luxuriantly, several flowering sts. being found on the same plant.

14. **itálica,** Linn. ITALIAN SQUILL. Bulbs ovate, clustered together: lvs. radical, several, flaccid, spreading, lanceolate, acute, 4–8 in. long, ¼–½in. broad: scape solitary, slender, longer than the lvs.: raceme dense, many-fld.: pedicels filiform, spreading; bracts in pairs: fls. fragrant, smelling like lilac, pale blue; perianth rotate, blue; segms. puberulous at apex; filaments white; anthers sagittate, dark blue. March–May. B.M. 663. L.B.C. 15:1483.—Hardy. This plant has less brilliant fls. than either *S. sibirica* or *S. bifolia*, but abundantly compensates for the paleness of its blue by the fulness and the sweetness of its fragrance. It is also taller than either of the others.

15. **japónica,** Baker (*Ornithógalum japónicum*, Thunb. *Barnárdia japónica*, Schult. f.). JAPANESE JACINTH. Bulb ovoid, 9–12 lines thick: lvs. 2–3, fleshy, herbaceous, 6–12 in. long, 4–16 lines broad, acute: scapes 1–3, strict, erect: raceme 20–60-fld.: pedicels



3577. Scilla sibirica. (×⅓)

ascending: bracts minute, linear, white: perianth 1½ lines long, rose-purple: caps. turbinate, trisulcate, 2½–3 lines long; ovules solitary in each ovarian locule. Japan.

16. **vérna,** Huds. SEA-ONION. SPRING SQUILL. A delicate little plant, with a small bulb and narrow-

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linear lvs. 2–4 in. long: scape seldom 6 in. long, with several small, erect blue fls. in a short, terminal raceme, almost flattened into a corymb: perianth-segms. scarcely above 3 lines long, spreading. Spring. A plant occurring in stony and sandy wastes near the sea in W. Eu., as in Denmark, reappearing farther east on the Rhine and in Sardinia.—Hardy.

3578. Scilla amœna. (×⅓)

S. axillàris, C. H. Wright. Of robust habit: lvs. 1 ft. long, 2½ in. broad: raceme many-fld.: perianth-segms. white outside with green keel, bright violet edged with white inside. Hab.(?).—*S. cilícica*, Siehe. Bulb bluish violet: lvs. 4–8 in. long, about ½in. broad at apex: scape slightly taller than lvs.: pedicels one-half as long as fls.: fls. 2–6, bright blue, often tinged with violet; filaments white, thread-like. Asia Minor. G.C. III. 44:194, desc.

JOHN W. HARSHBERGER.

SCINDÁPSUS (an old Greek name, transferred to these plants). *Aràceæ*. Climbing perennials, differing from Monstera in floral characters and in the long-petioled, long-sheathed, ovate-lanceolate, or ovate-acuminate lvs.—Species about 20 (Engler & Krause, Pflanzenreich, IV. 23B), E. Indies. Scindapsus comprises one popular and worthy warmhouse plant, that known to gardeners as *S. argyræus*; also *S. aureus*, Engler (see *Pothos aureus*).

pictus, Hassk. Internodes of the st. 3–4 in. long, 2 in. thick: petioles 1½–2 in. long; blade 4–6 in. long, 2½–3¼ in. wide, one side half as wide as the other, coriaceous, bright green (drying black), obliquely ovate-cordate. Var. **argyræus,** Engler (*S. argyræus*, Hort. *Pòthos argyræus*, Hort.), is the cult. form, with broad, deeply cordate lf.-blades which are spotted and blotched above with silvery white. Celebes, Philippines, Java.

S. anómalus, Hort.=Monstera acuminata.—*S. Cucudria*, Preal, is sometimes kept separate as Cucuaria marantifolia. Not known to be in the trade. It is a question whether the Aglaonema commutatum sometimes mentioned in horticultural literature is this species or is properly referable to Aglaonema.—*S. pertùsus*, Hort. =Rhaphidophora pertusa.

JARED G. SMITH.

SCÍRPUS (Latin for *bulrush*). BULRUSH. SEDGE. *Cyperàceæ*. A large group of rush-like or grass-like plants inhabiting the whole globe. Flowers perfect, in spikelets which are solitary, clustered or umbellate; scales spirally arranged; perianth of bristles or none, not enlarged in fr., smooth or barbed, persistent; ovary 1-loculed, with 1 anatropous ovule; style not thickened at the base, 2–3-cleft: fr. an achene with bristles attached. Only a few species are in cult., and these are all perennials (except perhaps the last), suited for shallow water or damp places. The larger are important for use in aquatic gardens. The nomenclature of those in the trade has been very much confused.

A. *Sts. leafy.*

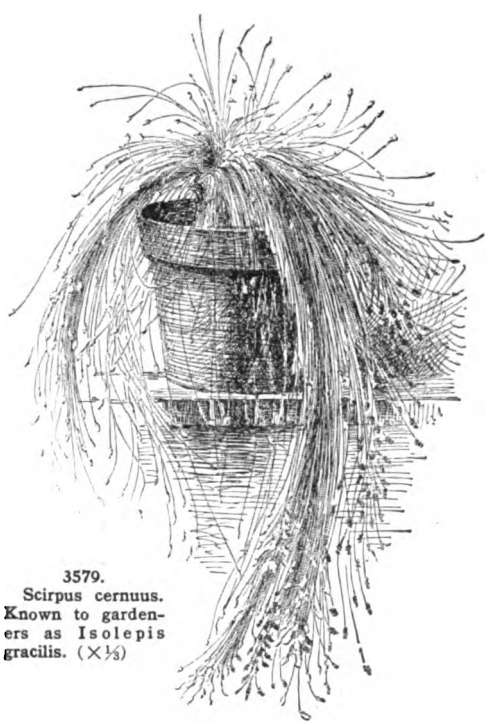
atróvirens, Muhl. Sts. clustered, tall and stout, 2–4 ft. high, bluntly triangular: lvs. long, coarse, and firm, 3–6 lines wide, spreading: involucre foliaceous: umbel sparingly compound; rays stiff, very unequal; spikelets ovoid-oblong, acutish, dark greenish brown, in dense heads of 5–25; scales oblong, cuspidate; perianth-bristles 6, downwardly barbed above; styles 3. E. U. S. in mud or damp soil.

Holoschœnus, Linn. Stiff and rush-like, from stout rootstocks: sts. clustered, slender, cylindrical, 1–3 ft. high: lvs. 1–2, basal, stiff, erect and narrow, furrowed: bracts several, the larger one appearing as a continuation of the st.; spikelets very numerous and small, closely packed in 1 to several globular, light brown heads, 3–5 lines in diam.; scales ovate, mucronate, ciliate; perianth-bristles none; styles 2–3-cleft. Eu., Asia.—The form in cult is var. **variegàtus,** Hort., with sts. alternately banded with green and yellowish white. Damp or dry soil.

AA. *Sts. with very short basal lvs. or none.*

B. *Rootstocks very stout, creeping: sts. scattered, 3–9 ft. high.*

lacústris, Vahl. GREAT BULRUSH. Sts. terete, smooth, tall, stout, and flexible, 3–9 ft. high: lvs. reduced to a few basal sheaths: bracts very short, erect: umbel compound, flexuous: spikes in heads of 1–5, oblong-conical, pale brown, 2½–8 lines long; scales ovate-oblong, obtuse, rarely mucronate; perianth-bristles 4–6, downwardly barbed throughout; styles 2–3. In shallow quiet water, N. Amer., Eu., Asia.—A composite species probably consisting in Eu. and Amer. of several distinct forms, each of specific rank. Typical *S. lacustris* is a 3-style form common in Eu., not found in Amer. *S. Tabernæmontànus*, Gmel., is a European 2-style form. The horticultural variety of the latter species, with alternate bands of green and yellowish white, is var. **zebrìna,** Hort. (*Jùncus zebrìnus*, Hort.). *S. vàllidus*, Vahl, and *S. occidentàlis*, Chase, are 2-styled American species. *S. heterochætus*, Chase, is a 3-styled American form. The bulrush is very effective as a border plant in aquatic gardens.



3579. Scirpus cernuus. Known to gardeners as Isolepis gracilis. (×⅓)

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BB. *Rootstocks almost wanting: sts. cespitose, forming turf, 3–12 in. high, very slender.*

cérnuus, Vahl (*S. grácilis,* Koch. *Isólepis grácilis,* Hort.). Fig. 3579. Sts. very slender or filiform, cylindrical, erect or more often drooping: basal sheaths leafless or with a very short filiform blade: involucral bract subulate, about equaling the spikelet, the latter usually solitary, oblong-lanceolate, 1–3 lines long; scales oblong-oval, obtuse, pale brown or whitish; bristles none; styles 3: achene in greenhouse plants rarely maturing. Widely distributed, common in Eu. G. 21:614; 25:111.—Grows well in damp pots, the drooping sts. producing a very graceful effect. This plant is now considered under Scirpus by practically all authors. *S. cernuus* is an older name than *S. gracilis.*

K. M. WIEGAND.

SCLEROCÁRPUS (Greek, *hard* and *fruit,* the achenes are inclosed in a hardened palea). Syn., *Gymnópsis,* in part. *Compósitæ.* Annual or perennial strigose-pubescent herbs, suitable for outdoor planting in the S.: sts. branching: lvs. alternate or the lower rarely all opposite, dentate or subentire: heads small or medium, at the ends of the branches, pedunculate, many-fld.: fls. yellow; the ray-fls. few to several, fertile; pappus wanting: achenes more or less 4-sided with a broad flat summit.—About 15 species. N. Amer., region of Texas and Mex., Trop. Afr., and Trop. Asia. *S. uniseriàlis,* Benth. & Hook. f. (*Gymnópsis uniseriàlis,* Hook. *Gymnolòmia uniseriàlis,* Hort.). Annual, 1–2 ft. high, loosely branched: lvs. alternate, slender-petioled, deltoid- or rhombic-ovate, or the uppermost lanceolate, coarsely dentate, the strigose pubescence of the lower surface canescent: corollas orange. Texas and Mex. R H. 1853:261. G.C. III. 28:165.

SCLEROCÀRYA (Greek, *hard* and *nut* or *kernel*). *Anacardiàceæ.* Trees or shrubs, one of which, *S. cáffra,* has been intro. into S. Calif.: lvs. aggregated toward the ends of the branches, alternate, odd-pinnate, glabrous; lfts. opposite, long-petiolate, very entire, glaucous below: the male fls. spicate; fls. polygamous; sepals 4, orbicular, colored, imbricate; petals 4, oblong, obtuse, spreading, reflexed, imbricate; disk depressed, entire; stamens in the male fls. 12–15, in the female fewer; ovary subglobose, 2–3-celled: drupe somewhat fleshy, the shell woody, 2–3-celled.—About 5 species, Trop. and S. Afr. *S. cáffra,* Sond. Glabrous: lvs. alternate, 6–12 in. long; lfts. 1½–2 in. long, with a short, often oblique tapering point, base acute, pale below: male spikes 2–4, terminal: fls. very short-pedicelled, bracteolate, the dried pedicel red: drupe suborbicular, the size of a small walnut. S. Afr.

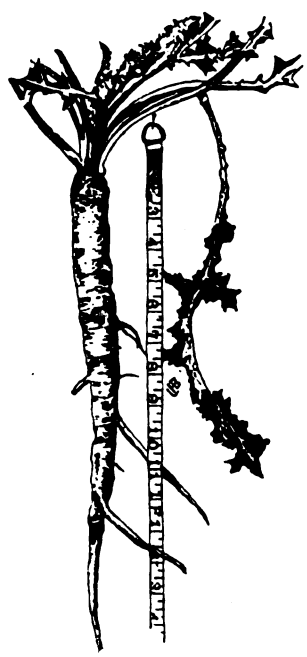
SCOLOPÉNDRIUM (from *Scolopendra,* the name of a centiped, the resemblance being found in the lines of linear sori on the backs of the lvs.). *Polypodiàceæ.* The name most common in the trade for the hart's-tongue ferns (known as *Scolopendrium vulgare*) and its varieties. See *Phyllitis.*

SCOLÒPIA (Greek, *thorn* or *stake,* probably so named on account of the spines). *Flacourtiàceæ.* Spiny trees, the spines often compound, one of which, *S. crenata,* has been intro. in S. Calif.: lvs. alternate, entire; stipules minute or none: fls. small, racemed, axillary, dicœcious; sepals 4–6; petals 4–6, subsimilar; stamens many; ovary 1-celled: berry 2–4-seeded.—About 30 species, Afr., Asia, and Austral.

crenàta, Clos. Branches of young trees armed, of old unarmed: lvs. 2–6 x 1–2 in., ovate or oblong-lanceolate, base acute, obtusely or acutely acuminate, subcrenate, glabrous: racemes axillary, 1–3 in. long: sepals and petals 5–6 each: fr. globose, green, when dry the size of a cherry. India, China, and the Philippines.—Intro. into Calif.

SCÓLYMUS (old Greek name used by Hesiod). *Compósitæ.* Three or four herbs, all natives of the Mediterranean region. *S. grandiflorus,* a perennial species, is rarely cultivated abroad for its flowers and *S. maculatus,* an annual species, for its variegated foliage.

Scolymus hispanicus (Fig. 3580) is the vegetable known as golden thistle or Spanish oyster plant. It makes a root very like salsify, except that it is much lighter colored and considerably longer. Its flavor is less pronounced than that of salsify, but when carefully cooked, it possesses a very agreeable quality which is somewhat intermediate between that of salsify and parsnip. It is adapted to all the methods of cooking employed for those vegetables. The particular value of the Spanish oyster plant, aside from affording a variety in the kitchen-garden, is its large size and productiveness as compared with salsify. The product may be nearly twice as great, for a given area, as for salsify. The seeds are much easier to handle and to sow than those of salsify. They are sown in March or April. The seeds, or rather achenes, are flat and yellowish, surrounded by a white scarious margin. The roots may be dug either in fall or spring. The greatest fault of the Spanish oyster plant lies in the prickly character of the leaves, which makes the plant uncomfortable to handle. The roots are often 10 to 12 inches long and 1 inch thick. It is said that the leaves and stalks are eaten like cardoons by the people of Salamanca; also that the flowers are used to adulterate saffron.



3580. Spanish salsify, or golden thistle.—Scolymus hispanicus.

The *S. hispanicus,* Linn., is a biennial plant, native to S. Eu. The radical lvs. are very spiny, oblong, pinnatifid, dark green, marked with pale green spots. The plant grows 2–2½ ft. high, is much branched and bears bright yellow fl.-heads which are sessile and contain only 2 or 3 fls., all of which are ligulate. The heads are sessile, terminal, and axillary. L. H. B.

SCOPÒLIA (named in honor of Joh. Ant. Scopoli, 1725–1788). *Solanàceæ.* Erect slightly branched glabrous hardy perennial herbs for outdoor planting: lvs. membranaceous, entire: fls. lurid purple or greenish, veined, nodding, borne on solitary filiform pedicels; calyx broad-campanulate, membranaceous truncately or broadly 5-lobed; corolla campanulate, the limb folded, 5-angled or shortly and broadly 5-lobed; stamens 5; ovary conical, 2-celled almost to the apex: caps. included in the calyx.—About 5 species, 1 in Eu., 1 in Himalaya, and the others in Japan and China. *S. carniólica,* Jacq. (*Hyoscỳamus Scopòlia,* Linn.). About 1 ft. or more high: lvs. entire, petiolate, about 3 in. long, ovate or obovate-oblong, subcuspidate: fls. solitary, axillary, nodding; corolla lurid red, yellow, or green inside. Russia. B.M. 1126.—Somewhat used in medicine.

SCORODÓSMA: *Ferula;* supplementary list.

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SCORPIÙRUS (Greek, *scorpion* and *tail*, alluding to the twisted form of the legume). *Leguminòsæ*. Nearly hardy stemless or decumbent herbs, adapted to the open border: lvs. simple, very entire, elongate, twisted and folded; stipules adnate to the petiole: fls. yellow, often few, solitary or umbelled, on axillary peduncles, nodding; calyx with the 2 upper lobes connate above; petals long-clawed, the standard suborbiculate, the wings oblique-obovate or oblong, the keel incurved, beaked-acuminate; stamens free from the standard; ovary sessile, many-ovuled: legume subterete, circinate-involute, sulcate-costate, the ribs often tuberculate or muricate, indehiscent.—About 6 species, S. Eu., N. Afr. to the Canary Isls., and W. Asia. Prop. by seed sown in the open border in the spring. *S. vermiculàta*, Linn. A trailing annual: lvs. tapering into the petioles: fls. solitary on the peduncles, the standard streaked with red: pod thick, glabrous, with the inner ribs almost obsolete, but the 10 outer ones bear crowded stipitate tubercles which are obtusely dilated at the apex. Medit. region. See the article *Worms*.

SCORZONÈRA (old French *scorzon*, serpent; *S. hispanica* was used against snake-bites). *Compósitæ*. The vegetable known as scorzonera or black salsify is a plant with a long fleshy tap-root like that of salsify, but differing in having a black skin. The flesh, however, is white. It is cultivated and cooked like salsify, but being somewhat more difficult to raise it is rarer than that vegetable, although considered by many to be superior to it in flavor. The leaves may be used for salads. Scorzonera is a perennial plant, but it is treated in cultivation as an annual or biennial crop.

Perennial herbs, or rarely annual, floccose, lanate or hirsute: lvs. sometimes entire and grass-like, or wider, sometimes more or less pinnately lobed or dissected: heads long-peduncled, yellow, the fls. all radiate: achenes glabrous or villous.—Over 100 species, all natives of the Old World. Cult. same as salsify.

Botanically, also, Scorzonera is closely allied to salsify. The two vegetables are easily distinguished in root, leaf, flower, and seed. The leaves of Scorzonera are broader, the flowers are yellow (those of salsify being violet), and the seeds are white. Also, the involucral bracts of Scorzonera are in many series; of salsify, in one series.

hispánica, Linn. SCORZONERA. BLACK SALSIFY. Perennial herb, 2 ft. high: st. much branched: lvs. clasping, lanceolate, or in some forms linear, undulate, glabrous: heads solitary at the ends of the many branches of the infl. Cent. Eu. WILHELM MILLER.

SCOTCH BROOM: *Cytisus scoparius*. **S. Pine**: *Pinus sylvestris*.

SCOURING-RUSH: *Equisetum*.

SCREW BEAN: *Prosopis*. **S. Pine**: *Pandanus*.

SCROPHULÀRIA (a reputed remedy for scrofula). *Scrophulariàceæ*. FIGWORT. Herbs or subshrubs, glabrous or hirsute, often fetid, sparingly grown in the herbaceous border.

Leaves opposite or the upper alternate, entire, incised, or dissected: cymes lax, in a terminal simple or somewhat branched thyrsus: fls. small, rarely rather large, greenish purple, purple, lurid or yellow; calyx deeply 5-cleft or 5-parted; corolla 5-lobed, short, 4 erect, the anterior one spreading; stamens 4, perfect, didynamous: caps. ovoid or subglobose.—About 150 species, Medit. region, Orient and N. Amer.

aquática, Linn. A tall glabrous plant: sts. very acute-angled or winged: lvs. ovate-oblong, rather obtuse, base cordate; the petioles winged: thyrse elongated, often 1–2 ft. long, the cymes peduncled, laxly many-fld.: calyx-segms. orbiculate. Eu. and Caucasus. Var. **variegàta**, Hort., the lvs. have a broad white marginal band.

marilándica, Linn. (*S. nodòsa* var. *marilándica*, Gray). A tall-growing hardy perennial herb, usually 5 ft. high, often more, with large, dark green, ovate-acuminate lvs. and small, dull purplish or greenish fls. in a nearly naked, open thyrse. Throughout the U. S. —The plant is sometimes used as a foliage background for the herbaceous border. It is too inconspicuous in fl. and too weedy in habit for general use.

F. TRACY HUBBARD.†

SCURVY-GRASS (*Cochlearia officinalis*, Linn.), a common European perennial, is so called from its anti-scorbutic qualities which have long been recognized. Stimulant, diuretic, stomachic, and laxative properties have been ascribed to it. In general appearance—leaf, flower, and fruit—it somewhat resembles its close relative, water-cress, but in flavor it is acrid, bitter, pungent, and has a strong suggestion of tar. Bruising reveals a disagreeable odor. When cultivated it is treated as an annual, the seed being sown on garden loam in a cool, shady place where the plants are to remain. It is grown to a limited extent in America, has escaped from cultivation, but so far has not become obnoxious as a weed like water-cress and horse-radish. Consult Vol. II, p. 808, for botanical description. M. G. KAINS.

SCUTELLÀRIA (Latin, *dish;* referring to the form of the persistent calyx). *Labiàtæ*. SKULLCAP. Annual or perennial herbs, or decumbent or diffuse rarely tall and erect subshrubs or very rarely shrubs, suitable for outdoor planting.

Leaves opposite, frequently dentate, sometimes pinnatifid or entire; the floral lvs. similar or changed into bracts: fls. in opposite 2-fld. floral whorls or in some species a few at the top, sometimes disposed in all or the lower axils, sometimes in terminal racemes or spikes, blue, violet, scarlet, or yellow; calyx campanulate, 2-lipped; corolla-tube long-exserted, limb 2-lipped; stamens 4, ascending, all fertile, the anterior pair longer: nutlets subglobose or depressed.—About 140 species scattered over the world, mostly in the temperate regions and the mountains, a few in Trop. Afr., not known from S. Afr.

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KEY TO THE SECTIONS.

A. *Floral lvs. membranaceous: fls. 4-angled-spicate or subracemose, scarcely secund.*
Section I. LUPULINARIA. Species 1, 2.

AA. *Floral lvs. herbaceous: fls. secund.*
B. *Fls. not opposite, all or at least the uppermost remote.* Section II. HETERANTHESIA. Species 3.

BB. *Fls. opposite.*
C. *Infl. composed of fls. in terminal single or panicled racemes. (The delimitations between this and the following section are not well marked.)*
Section III. STACHYMACRIS. Species 4–11.

CC. *Infl. composed of fls. solitary in the axils or in axillary and terminal racemes.*
Section IV. GALERICULARIA. Species 12–18.

Section I. LUPULINARIA.

All Old-World species.

A. *Lvs. green on both surfaces or hardly crenate* ..... 1. **alpina**

AA. *Lvs. hoary beneath, incise-dentate or pinnatifid* ..... 2. **orientalis**

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1. **alpìna,** Linn. A hardy spreading perennial, about 10 in. high, with ovate, serrately dentate lvs. and large, purple and white or somewhat yellowish fls. in dense, terminal racemes. July, Aug. Eu. R.H. 1889:12.—A handsome rock or low border perennial. Var. **álba,** Hort., a white-fld. form offered in the trade. Var. **cærùlea,** Hort., is offered in the trade. Var. **lupulìna,** Benth. (*S. lupúlina,* Linn. *S. lupúlina bícolor,* Hort.), is a form with yellow fls. Var. **rôsea,** Hort., is offered in the trade,

2. **orientàlis,** Linn. (*S. grandiflòra,* Sims, not Adams. *S. pulchélla,* Bunge). A hardy perennial, procumbent: lvs. long-petioled, ovate, dentate, tomentose: fls. purplish, with a yellow throat or almost entirely yellow. Altai Mts. B.M. 635.

Section II. HETERANTHESIA.

All American species.

3. **Ventenátii,** Hook. Perennial: sts. erect, branched, everywhere soft-slender-pubescent: lvs. long-petioled, rather thick, cordate-ovate, rather obtuse, coarsely serrate: racemes terminal, elongated, subsecund or subdistichous: calyx small; corolla scarlet, about 1 in. long, the upper lip deeply 4-cut. Colombia. B.M. 4271. G.C. III. 35:376.

Section III. STACHYMACRIS.

A. *Lvs. subsessile or short-petioled, subentire, lanceolate or linear* ..... 11. **baicalensis**
AA. *Lvs. petioled, crenate or serrate, ovate to subrotundate.*
B. *Base of the lvs. narrowed, blades usually ovate-oblong or oblong-lanceolate.*
C. *Margins serrate* ..... 9. **montana**
CC. *Margins entire* ..... 10. **brevifolia**
BB. *Base of at least some of the lvs. truncate or cordate.*
C. *Floral lvs. sessile or shorter than the calyx.*
D. *Sts. procumbent or low, scarcely 1 ft. high.*
E. *Surface of lf. villous above and below: lvs. small, subrotundate* ..... 4. **indica**
EE. *Surface of lf. hispidulous above: lvs. ovate* ..... 5. **violacea**
DD. *Sts. erect, more than 1 ft. high.* .. 6. **altissima**
CC. *Floral lvs. petiolate, equaling or exceeding the calyx.*
D. *Corolla purple to violet* ..... 7. **peregrina**
DD. *Corolla white* ..... 8. **albida**

4. **índica,** Linn. St. procumbent at base: branches ascending, 6 in. to 1 ft. high: lvs. small, petiolate, rotundate, crenate, base cordate, both surfaces minutely pubescent: raceme dense, subsimple, 3–4 in. long: fls. opposite, secund; calyx pubescent; corolla bluish, rather glabrous, the lower lip very broad. China and Japan. Var. **japónica,** Hort. (*S. japónica,* Morr. & Decne.), grows about 6 in. high: lvs. ovate, gray-green: fls. blue or lilac; corolla pubescent. Japan. P.M. 10: 123. F.S. 2:80. H.U. 5, p. 105. G.M. 57:791.

5. **violàcea,** Heyne. Herb, 6–12 in. high: st. erect or ascending, pubescent: lvs. petioled, cordate-ovate, 1–3 in. long, crenate, pubescent or glabrous beneath: racemes 4–5 in. long, lax, subsimple: fls. opposite, secund; calyx pubescent; corolla ½in. diam., violet. India and Ceylon. B.M. 8320. G.W. 14, p. 620.

6. **altíssima,** Linn. St. erect, branched: lvs. petioled, ovate or ovate-lanceolate, crenate, base broad-cordate, scarcely rugose: racemes elongated, somewhat branched, villous: fls. opposite, secund; calyx villous; corolla creamy yellow, 4 times as long as the calyx. S. E. Eu. and Caucasus.

7. **peregrìna,** Linn. Sts. procumbent: branches elongated, glabrous or pubescent near the ends: lvs. petioled, ovate, obtuse, crenate, base rotund-truncate, glabrous or slightly pubescent: racemes elongated, lax: fls. subsessile, opposite, secund; calyx large, somewhat pilose; corolla violet, pubescent outside. S. Eu. and the Orient.—The sts. and lvs. are frequently glabrous and dark purplish or reddish.

8. **álbida,** Linn. Branches elongated, pubescent: lvs. 1½ in. long, petioled, broad-ovate, coarsely crenate, base rotundate-truncate or the lowest cordate: racemes often more than 1 ft. long, lax: fls. opposite, secund, subsessile; calyx pilose; corolla ½in. long, dirty white, villous outside. S. E. Eu. and Cent. Asia.

9. **montàna,** Chapm. Perennial, tomentose-pubescent: st. simple, erect, 1–1½ ft. high: lvs. ovate or oblong-ovate, coarsely and sharply serrate, lowest subcordate, upper acute at both ends, petioled: raceme simple, few-fld.: fls. opposite; corolla large, 1¼–1½ in. long, blue. Mountains of Ga.

10. **brevifòlia,** Gray. A half-hardy, compact perennial, ½–1 ft. high: lvs. numerous, oblong, narrow, about ½in. long: fls. dark purple, about ¾in. long. Blooming season long; summer. Dry limestone banks, Texas.

Subsection ANGUSTIFOLIÆ.

11. **baicalénsis,** Georgi (*S. macrántha,* Fisch.). A hardy perennial herb, almost glabrous: st. half erect, about 1 ft. high: lvs. lanceolate, obtuse, ciliate: fls. blue, in many simple racemes; calyx-hood incurved. July, Aug. E. Asia. Var. **cœléstina,** Hort., has large spikes of bright blue fls. July. G.W. 9, p. 61.

Section IV. GALERICULARIA.

A. *Fls. scarlet or red, irregularly arranged in axillary and terminal racemes: lax herbs or shrubs* ..... 18. **Mociniana**
AA. *Fls. blue or violet.*
B. *Infl. composed of axillary racemes: lax, strongly branched herbs* ..... 17. **lateriflora**
BB. *Infl. composed of solitary axillary fls. or the uppermost fls. subracemose.*
C. *Margins of lvs., at least the lower, crenate or dentate or the base hastate* ..... 13. **galericulata**
CC. *Margins of lvs. all entire.*
D. *Blades oblong-lanceolate or linear* ..... 12 **angustifolia**
DD. *Blades ovate*
E. *Lvs. petiolate, remote* ..... 16. **antirrhinoides**
EE. *Lvs. subsessile, approximate.*
F. *Plants without moniliform tubers* ..... 14. **resinosa**
FF. *Plants with moniliform tubers* ..... 15. **Brittonii**

Subsection GENUINÆ.

12. **angustifòlia,** Pursh. A hardy perennial, about 6 in. high, with lvs. ½–1 in. long, narrowed at the base, and violet-blue fls. ¾–1 in. long, with the corolla-tube slender. Moist ground, N. W. U. S.

13. **galericulàta,** Linn. Hardy, perennial by filiform stolons, 1–3 ft. high: lvs. ovate to oblong-lanceolate, about 2 in. long: fls. solitary in the axils of the upper lvs., about 1 in. long. June–Sept. In moist ground throughout the U. S. and Eu. B.B. 3:83; (ed. 2) 3:109.

14. **resinòsa,** Torr. (*S. Wrìghtii,* Gray). Plants minutely glandular-pubescent: sts. herbaceous, low, erect and much-branched: lvs. about ½in. long, ovate or spatulate-oblong, very obtuse, both surfaces green, entire, base rotundate or subcuneate not cordate, resinous-glandular: fls. axillary, opposite, secund; calyx glandular-pubescent; corolla blue, densely villous. Kans. to Texas and westward to Ariz. B.B. (ed. 2) 3:108.

15. **Brìttonii,** Porter. Glandular- or viscid-pubescent, branching from the base, 4–8 in. high: lvs. oblong or oval, sessile and entire or the lowest short-petioled and slightly crenulate: fls. solitary in the axils; corolla blue

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(pale blue and white according to some). Wyo. and Colo., and probably W. Neb. B.B. (ed. 2) 3:108.—Allied to *S. resinosa*.

16. **antirrhinoides,** Benth. Resembles the larger-leaved forms of *S. angustifolia*, but has longer petioles and the lvs. mostly obtuse at base and also shorter and broader fls. 7–10 lines long. Shady ground, N. W. U. S.

Subsection LATERIFLORÆ.

17. **lateriflòra,** Linn. A hardy perennial, increasing by slender stolons, 1–2 ft. high: lvs. ovate to lanceolate, 1–3 in. long: racemes axillary or terminal, narrow, leafy bracted: fls. blue to nearly white. Moist soil throughout the U. S. B.B. (ed. 2) 3:106.

Subsection PTERILOMIOIDEÆ.

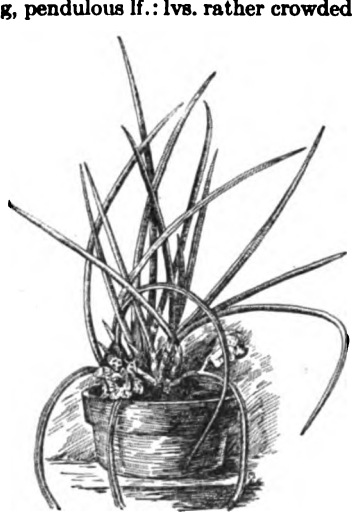
18. **Mociniàna,** Benth. A tender, moderately low, shrubby plant, probably the most showy of the genus, with opposite, long-elliptical, acute lvs., and long, tubular, red fls. with a yellow throat, about 1½ in. long, in dense, terminal spikes. Autumn. Mex. R.H. 1872:350. G.W. 11, p. 127. G.Z. 13:2.—According to Gn. 10, p. 606, the plants are of easy cult. with warm greenhouse treatment and may be grown as bush specimens or in smaller pots with a single st., when they will flower at about 1 ft. in height. Cuttings are easily rooted.

S. aurantiaca, Hort., is offered in the trade.—*S. pulchélla*, Hort., not Bunge, belongs to Section III and is closely related to S. indica var. japonica, but the plant has more slender twigs, somewhat smaller lvs. which are short stiff-hairy on the upper surface and a looser raceme with somewhat darker blue fls. Hab.(?). Gt. 6:296.—*S. splèndens*, Link, Klotsch & Otto, belongs to Section II and has broad ovate, obtuse or scarcely acuminate, crenate lvs., with the base cordate and both surfaces hirsute: raceme elongated: fls. sparse; corolla scarlet. Mex. B.M. 4290 (as S. cordifolia).

F. TRACY HUBBARD†

SCUTICÀRIA (Latin, *scutica*, lash or whip). *Orchidàceæ*. Orchids remarkable for their long whip-like leaves, which are channeled on one side.

No evident pseudobulbs formed, but each shoot terminating in a long, pendulous lf.: lvs. rather crowded on the short rhizome: fls. solitary or several, on short peduncles, in structure fls. resembling Maxillaria, but the plants are easily distinguished by the terete lvs.; sepals and petals similar, the lateral ones forming a mentum; labellum movable, 3-lobed, with large, erect, lateral lobes; pollinia on a transversely elongated stipe.—Two species from S. Amer.



3581. Scuticaria Steelii.

These plants require a temperature similar to cattleya and lælia, but should be grown on blocks or in shallow baskets in a mixture of equal parts peat fiber and sphagnum. *S. Steelii* does best on a block, as the plant grows downward in an inverted position. The compost should be kept moist, particularly while the plants are in action. They are propagated by division. (R. M. Grey.)

Steèlii, Lindl. Fig. 3581. Lvs. attain a length of 4 ft., as thick as a goose-quill: fls. on short scapes; sepals and petals oblong, connivent, pale yellow, with chocolate blotches; labellum large, cream-colored, striped with brownish purple, at all seasons. British Guiana. B.M. 3573. B.R. 1986 (both as *Maxillaria Steelii*).

Hádwenii, Planch. Lvs. 1½ ft. long: fls. with spreading sepals and petals oblong, sharply acuminate, yellowish green, blotched with brown; labellum obovate-cucullate, white with flesh-colored spots. Brazil. B.M. 4629. F.S. 7:731 (both as *Bifrenaria Hadwenii*). G.M. 41:558.

HEINRICH HASSELBRING.

SCYPHÁNTHUS (Greek, *beaker* and *flower*, alluding to the shape of the flower). Syn., *Grammatocárpus*. *Loasàceæ*. Climbing pubescent half-hardy annual herbs for outdoor border planting: lvs. opposite, 2–3-pinnatisect: fls. axillary, sessile, yellow; calyx-tube linear-elongate, lobes 5, spreading, linear-spatulate; petals 5, saccate, alternate, with smaller scales which are hooded, 3-aristate and at base have 2 calli; stamens very many, in 5 fascicles opposite the petals, staminodia 10, in pairs opposite the scales; ovary elongated, 1-celled: caps. linear, upright, longitudinally 3-valved.—One or 2 species, Chile.

élegans, Don (*Grammatocárpus volùbilis*, Presl). Sts. herbaceous, climbing and twining, frequently branched: lvs. opposite, rough with minute deflexed hairs, the lower ones bipinnatifid, the upper ones smaller and only pinnatifid, all the segms. oblong, 1-nerved; petiole short, channeled: fls. really sessile but appearing peduncled from the elongated inferior ovary, terminal or axillary, yellow, calyx-tube very long and incorporated with the ovary, limb of 5 spreading, spatulate, leafy segms.; petals 5, forming a cup, obovate-spatulate, deeply saccate below the middle. B.M. 5028. J.H. III. 44:272.

F. TRACY HUBBARD.

SEAFÓRTHIA (Francis Lord Seaforth, patron of botany). *Palmàceæ*. A genus of palms, founded by Robert Brown on an Australian species, usually considered as synonymous with Ptychosperma. The *Seaforthia elegans* of cultivation, however, is said to be Archontophœnix, mostly *A. Cunninghamii* and perhaps some of it *A. Alexandræ;* the original species described by Brown as *S. elegans* becomes *Ptychosperma elegans*, Blume.

According to Dammer (G.C. III. 31, pp. 18–20) the true *Ptychosperma elegans* of Blume is met with but rarely in European gardens. What is cultivated under this name in most cases is either *Archontophœnix Cunninghamii* or *A. Alexandræ*. These archontophœnixes "are decorative hardy palms, forming on the Riviera very fine high-stemmed specimens. In youth they form bifid leaves, the blade almost horizontal. After having made some four to six such leaves, each larger than the foregoing, there appears a fully pinnate leaf, much differing in mode of growth from Phœnix and other pinnatisect-leaved palms." *Seaforthia elegans*, Hort., and *Ptychosperma elegans*, Hort., are apparently sometimes *Archontophœnix Cunninghamii* and sometimes *A. Alexandræ*. The last is very like *A. Cunninghamii*, but, according to Dammer, differs in its segments, which are green only above while underneath they are ashy-glaucous or white; it is well figured in G.C. III. 31:19; also in B.M. 4961 as *Seaforthia elegans*. *A. Cunninghamii* is figured in B.M. 7345 as *Ptychosperma elegans*. The true *Ptychosperma elegans*, Blume (*Seaforthia elegans*, R. Br., not Hort.), with pinnules erose rather than acuminate at apex, is figured in G.C. III. 31:21.

In a recent study, O. F. Cook separates the plant grown in California under the name of *Seaforthia elegans* into a new genus, Loroma, making the species *L. amethystina;* probably from Australia. He also retains the genus Seaforthia for *S. elegans*, R. Br.

SEA-KALE (*Crambe maritima*, Linn.) is a large-leaved strong cruciferous perennial, the young shoots of which are eaten in the spring, usually after having been blanched. The plant is little known in North America, but it is worthy of general cultivation in the home-garden, for it supplies an esculent of good quality

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at a season when vegetables are scarce. Sea-kale demands a deep rich and rather moist soil, in order to give the best results and to maintain its vigor for a series of years. The plants require about as much room as rhubarb; that is, they should stand from 3 to 4 feet apart each way. The culture and general requirements are much the same as for rhubarb. The young shoots are blanched as they grow, in early spring. The blanching is accomplished by heaping fine loose earth over the crown of the plant, into which the shoots grow, or by covering the plant with an inverted box or flower-pot so that the light is excluded from the growing shoots. These shoots are eaten before the leaves have begun to expand to any extent, whilst crisp and tender. The vegetable is prepared as is asparagus.

Sea-kale is propagated by root-cuttings, and also by seeds. Quicker results are secured from cuttings. If strong cuttings, 4 or 5 inches long, are taken in early spring and grown in good and rather moist soil, the plants may be strong enough for cutting the following spring; but it is usually better not to cut them until two years from starting. The cuttings may be placed where the plants are to stand permanently, or they may be grown in drills in a seed-bed. The latter plan is usually to be preferred, since it allows the plants to receive better care. Seeds give plants that are strong enough for cutting about the third year. The seeds are really fruits or pods, and each fruit may produce two or three plants. Usually the fruits are sown without shelling. The seedlings are raised in the seed-bed and transplanted when one year old to permanent quarters. On good soil, plants of sea-kale should maintain their vigor for five to eight years after they have come to cutting age. As soon as they begin to show signs of decline, new plants should be propagated. Although the plant is hardy in the northern states, it is always benefited by a liberal dressing of litter or manure in the fall. Plants may be forced in hotbeds or under the greenhouse benches, as recommended for rhubarb. Sea-kale has large glaucous cabbage-like leaves which make it a striking plant for ornament early in the season. It also throws up a strong cluster bearing many rather showy white flowers. However, the plant is rarely propagated for its ornamental value. For botanical description, see Vol. II, p. 873.

L. H. B.

SEA-LAVENDER: *Statice.* **S.-onion:** *Urginea maritima;* also applied to *Ornithogalum caudatum* and *Scilla verna.* **S. pink:** *Armeria.*

SEBASTIÀNIA (from Antonio Sebastiani, a writer on Roman plants 100 years ago). *Euphorbiàceæ.* Tropical shrubs scarcely in cult.: juice milky: lvs. alternate, small, usually entire: infl. usually terminal: fls. apetalous; staminate calyx with 2–3 sepals free or connate at the base, imbricate; stamens 1–5; ovules 1 in each cell of the ovary: seed carunculate. About 75 very variable species, all tropical except *S. ligústrina,* Muell. Arg., in swamps from N. C. to Fla. *S. Pálmeri,* Rose, has very poisonous juice and the seeds are among the best known of the "Mexican jumping beans" which are inhabited by a small lepidopterous larva whose actions cause the springing motions of the seeds.

J. B. S. Norton.

SECÀLE (the ancient Latin name, said to be derived from *seco,* to cut; according to some applied to spelt). *Graminæ.* Spikelets with 2 perfect fls., sessile on opposite sides of a zigzag rachis, forming a terminal spike; glumes subulate, 1-nerved; lemmas keeled, long-awned.—Species 2, *S. fragile,* an annual of S. Russia, and *S. cereale,* the cult. rye, which, according to Hackel, is derived from a wild perennial form (*S. montanum,* Guss.), native in mountains, S. Eu. and Cent. Asia.

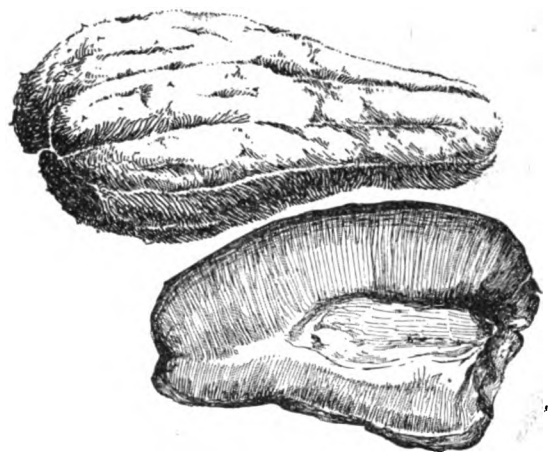
cereàle, Linn. Rye. Tall annual, commonly cult. in Eu., less so in U. S., as a cereal. Also cult. here for annual pasture. Dept. Agric., Div. Agrost., Bull. 20:163.

A. S. Hitchcock.

SÈCHIUM (probably from the Greek *sekos,* "to fatten in a fold," because it was fed to hogs). *Cucurbitàceæ.* A climbing sparsely hairy herb, with perennial tuberous roots, grown in tropical and subtropical regions for its large fruits, which somewhat resemble the summer squash in use and character.

Leaves membranaceous, 3-angled or -lobed, cordate at the base; tendrils 2–5-branched, opposite the lvs.: fls. small, monœcious, axillary, the pistillate solitary, the staminate in small clusters; calyx-tube saucer-shaped, the limb 5-lobed; corolla rotate, deeply 5-parted, the segms. ovate-lanceolate; filaments and styles connate into a central column, of which the anthers appear as lobes, while the stigmas are closely set together, forming a small head: fr. pear-shaped or globose, fleshy, 1-seeded.—One species, indigenous in Mex. and Cent. Amer. and widely planted.

edùle, Swartz (*Chayòta edùlis,* Jacq.). Chayote. Chayotli. Chouchoute. Chocho, Chuchu, or Xuxu. Choko. Chaiota. Mirliton. Christophine. Pipinella. Fig. 3582. Sts. herbaceous, annual, sometimes making a growth of 50 ft. in one season, if the



3582. Fruit of Sechium edule. (×⅓)

plant is grown on rich well-drained ground: large tuberous roots are formed the second season: lvs. 4–6 in. long, resembling those of the cucumber, deep green, somewhat rough, scarcely hairy; corolla greenish or cream-colored: fr. 3–8 in. long; seed single, flat, 1–2 in. long, attached at the upper end of the cavity. G.C. 1865:51; III. 24:476; 28:450.

The chayote is grown successfully in [illegible]thern California and about New Orleans, where [illegible] common. In Florida it is not yet common, [illegible] ture is being extended rapidly. It can [illegible] grown successfully in those parts of the Sou[illegible] ground does not freeze in winter. The fru[illegible] pear-shaped, smooth or corrugated, the sur[illegible] times covered with small soft spines. The color va[illegible] from nearly white to dark green, the flesh being firm, crisp, and more delicately flavored than the squash. The cooked fruit can be creamed, baked, or made into fritters, sauces, tarts, puddings, salads, or used like potatoes with other meats and vegetables. The young spring shoots, tender branches, and tuberous roots form palatable dishes, while the woody stems furnish a fine fiber, known in French as "paille de chouchou." The fruits, vines, and tubers are excellent fodder for stock.

The entire fruit is planted in early spring, and the vine should come into fruit after the rainy season, remaining in fruit (in the southern United States) until the plant is cut down by frost. Plants should be 8 to 10 feet apart, and trained on an arbor or trellis. In

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Florida and the Carolinas, a vine may yield fifty to one hundred or more fruits in a season. The fruit can easily be shipped, and stored for two to four months at moderate temperatures. In tropical and subtropical regions there are numerous varieties, differing somewhat in flavor and value. NATHAN MENDERSON.

SECURINÈGA (Latin, *securis*, hatchet, and *negare*, to refuse, alluding to the hard wood). *Euphorbiàceæ*. Shrubs sometimes grown for the bright green foliage.

Deciduous: lvs. alternate, short-petioled, entire, stipulate: fls. dicœcious or monœcious, apetalous, axillary, the pistillate solitary or few, the staminate in fascicles; sepals 5; stamens usually 5, with a 5-lobed disk at the base; pistillate fls. with entire disk; ovary 3-celled, with 3 2-lobed styles: fr. a 3-lobed dehiscent caps., 3–6-seeded.—About 10 species in temperate and subtropical regions of S. and Cent. Amer., Asia, Afr., and S. Eu.

The species in cultivation are bushy round shrubs with slender wand-like branches, rather small bright green foliage, inconspicuous greenish white flowers in axillary clusters or solitary and with small subglobose greenish capsules. They have proved fairly hardy at the Arnold Arboretum, usually only the tips of the young branchlets being winter-killed, and do not seem particular as to the soil. Propagation is by seeds which are usually freely produced when the two sexes are present, and by greenwood cuttings under glass.

ramiflòra, Muell. Arg. (*Géblera suffruticòsa*, Fisch. & Mey. *Flúggea suffruticòsa*, Bäill. *Acidòton ramiflòrus*, Kuntze). Shrub, 3–6 ft. high, with greenish branchlets: lvs. short-petioled, oval or ovate to ovate-lanceolate, acute or obtuse, cuneate at the base, entire, bright or yellowish green, glabrous, thin, 1–2 in. long: staminate fls. about 1½ lines across, in 5–10-fld. clusters; pistillate solitary: fr. about ⅛in. across, greenish. July, Aug. S. Siberia to Amurland and N. China.

S. fluggeoides, Muell. Arg. (S. japonica, Miq.). Very similar to S. ramiflora: branchlets soon becoming brown or purple: lvs. usually more obtusish: pistillate fls. 2–5. Japan, Korea, N. and Cent. China. —*S. Leucopyrus*, Muell. Arg.=Fluggea Leucopyrus.

ALFRED REHDER.

SEDÁSTRUM (*Sedum* and *star*). *Crassulàceæ*. A genus founded in 1905 to include seven species, most of which had been theretofore referred to Sedum, but differing from that genus in having erect rather than spreading carpels, slender styles, and other characters. Mexican cespitose perennials, with numerous sts. arising from a dense basal rosette of lvs. and dying to base after flowering: st.-lvs. alternate, mostly broad, fleshy: fls. in a more or less paniculate leafy infl.; calyx green and deeply cleft; corolla white or whitish, with distinct spreading lobes. Probably none is regularly in cult., but at least *S. ebracteàtum*, Rose (*Sèdum ebracteàtum*, Moc. & Sesse), has been listed abroad: fl.-sts. about a foot long, ascending or procumbent, pubescent, leafy, somewhat branching, bearing sessile or short-pedicelled whitish fls.: basal lvs. obovate or spatulate, flattened and fleshy, hairy or at least ciliate on margins.

SÈDUM (Latin, *sedes*, to sit: the plants fix themselves on rocks and walls). *Crassulàceæ*. Succulent herbs, rarely subshrubs, mostly hardy and perennial, useful for rockeries and one species, *S. spectabile*, a frequent showy border plant. See *Succulents*, Vol. V, page 2672.

Plants glabrous or glandular-pubescent, fleshy, erect or decumbent, sometimes cespitose or moss-like: lvs. very variable, opposite, alternate or whorled, entire or serrate: fls. cymose in a few axils and solitary, white, yellow, or rose, rarely red or blue, hermaphrodite or unisexual by abortion; calyx 4–5-lobed; petals 4–5 (rarely 6–7), free; stamens 8–10 (rarely 12–14); ovary 4–5-carpelled: follicles 4–5, free, many- or few-seeded.—About 280 species, mostly natives of the temperate and colder regions of the northern hemisphere. The hardy sedums are monographed, from a horticultural point of view, by M. T. Masters in Gardener's Chronicle for 1878. Masters' descriptions and treatment have been partially followed in the present revision. The variability of the lf. is very noticeable both in thickness and breadth, some being thick and terete, others flat and thin, though all of them tending toward fleshy. Some are quite linear and from that they range to nearly 1½ in. broad. The margin is also variable from entire to deeply dentate. The synonymy of the species is much involved and in some groups, especially the Telephium group, the specific delimitation is very uncertain; in fact the whole genus needs monographic study. The present key is an attempt to differentiate the more prominent forms as they occur in horticulture and is based in part on literature and in part on herbarium specimens. It is unfortunately not altogether satisfactory but may prove of some value in separating the species.

Sedums are of the easiest culture. As a rule, they prefer sandy soil, and are very averse to a wet position in winter. Some are useful plants for carpeting poor and sandy waste places where few other things will grow. The little yellow-flowered plant with pulpy foliage that spreads in nearly every cemetery is *Sedum acre*. Sedums are also general favorites in all forms of rock-gardening, They are much used for carpet-bedding, especially the kinds with mealy or glaucous foliage, and those with various metallic shades of purple. In the hardy border, the more robust and bushy kinds, like *S. maximum* and *S. spectabile*, are preferred, though any of the lower-growing kinds are suitable for edgings and any of the evergreen kinds are welcome in winter when the hardy border shows few other bits of color or signs of life. As a rule, sedums like the sun, but a few of the species may help to solve the difficult problem of carpeting the ground underneath the trees where the soil is dry and shaded. Sedums are also favorites for baskets and vases, especially the kinds with trailing stems and minute leaves. For greenhouse decoration, *S. spectabile* is the favorite, as it is perhaps the showiest of the genus. It may be had in flower at any season of the year and remains in bloom a long time. It is also one of the favorite sedums for window-sills, balconies, and house-tops, especially in crowded cities. *Sedum acre*, however, is everybody's plant. A piece of it is often the only pleasant sight in an ugly city alley. Sedums can be propagated by seeds, but they are easily multiplied by the young offsets. These rosettes are somewhat bulb-like in nature and sedums could probably be propagated if it were worth while by using each leaf of a rosette. (Wilhelm Miller.)

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KEY TO THE SPECIES.

A. *Lvs. terete or subterete (that is, relatively thick as compared to breadth).*
B. *Fls. yellow (except a white-fld. variety of No. 1).*
C. *Lf.-blades broad as compared to length.*
D. *Petals without a dorsal awn....* 1. **acre**
DD. *Petals with a short dorsal awn..* 2. **Stahlii**
CC. *Lf.-blades narrow as compared to length (usually linear).*
D. *Apex of lvs. blunt.*
E. *The lvs. papillose-pilose.....* 3. **multiceps**
EE. *The lvs. glabrous.....* 4. **sexangulare**
DD. *Apex of lvs. acute or acuminate.*
E. *Base of lvs. membranaceous and dilated, abruptly tapered to a much narrower upper part.....* 5. **tenuifolium**
EE. *Base of lvs. not distinctly dilated, not abruptly tapered to a much narrower upper part.*
F. *Petals acute or acuminate.*
G. *Sepals subulate.....* 6. **stenopetalum**
GG. *Sepals ovate-lanceolate.*
H. *Apex of sepals acutish.* 7. **sarmentosum**
HH. *Apex of sepals blunt..* 8. **Forsterianum**
FF. *Petals blunt.*
G. *The lvs. incurved, those of the barren shoots forming dense conical rosettes.....* 9. **rupestre**
GG. *The lvs. reflexed, those of the barren shoots not forming such marked rosettes.....* 10. **reflexum**
BB. *Fls. white, pink, or purplish.*
C. *Lf.-blades broad as compared to length.*
D. *Sepals ovate.....* 11. **anglicum**
DD. *Sepals oblong or linear to linear-lanceolate.*
E. *Petals oblong and blunt.*
F. *Color of fls. blue (sometimes rosy lilac).....* 12. **cæruleum**
FF. *Color of fls. white with the midrib of the petals pink.* 13. **brevifolium**
EE. *Petals lanceolate and acute.*
F. *Plant farinose-pruinose...* 14. **farinosum**
FF. *Plant not farinose-pruinose though often more or less glaucous.*
G. *Sts. much branched at the base: branches diffuse: fls. less than ¼ in. across.....* 15. **dasyphyllum**
GG. *Sts. rather simple: branches short and not diffuse: fls. nearly ⅜ in. across.....* 16. **potosinum**
CC. *Lf.-blades narrow as compared to length.*
D. *Petals relatively rather broad, their base somewhat narrowed.*
E. *The lvs. oblong or oblanceolate-oblong.....* 17. **pilosum**
EE. *The lvs. linear.*
F. *Sts. viscid-pilose above: sepals ovate.....* 18. **villosum**
FF. *Sts. not viscid-pilose though somewhat glandular-pilose above: sepals deltoid..* 19. **hispanicum**
DD. *Petals relatively narrow, usually lanceolate, their base broad.*
E. *Barren shoots lacking.....* 20. **arboreum**
EE. *Barren shoots present.*
F. *Sepals lanceolate, relatively narrow.....* 21. **pulchellum**
FF. *Sepals deltoid, ovate, oblong or elliptic, relatively broad.*
G. *Infl. glandular.....* 22. **monregalense**
GG. *Infl. not glandular.*
H. *The infl. rather openly racemose-cymose....* 23. **Alberti**
HH. *The infl. more or less densely corymbose-cymose.*
I. *Buds 5-angled: fls. pinkish.....* 24. **lydium**
II. *Buds nearly terete, oblong: fls. white.* 25. **album**
AA. *Lvs. flat (that is, relatively thin as compared to breadth).*
B. *Fls. unisexual (diœcious).*
C. *Color of fls. yellow.....* 26. **Kirilowii**
CC. *Color of fls. greenish or reddish purple.....* 27. **roseum**
BB. *Fls. bisexual (hermaphrodite).*
C. *The fls. yellow or greenish yellow, one species orange-yellow (fls. of No. 30 become pink with age).*
D. *The lvs. commonly not twice as long as broad (in No. 29 just about half as broad as long).*
E. *Sepals ovate.....* 28. **dendroideum**
EE. *Sepals linear to lanceolate.*
F. *Margin of lvs. dentate above.* 29. **Woodwardii**
FF. *Margins of lvs. entire.*
G. *Petals united below.....* 30. **oreganum**
GG. *Petals not united below.*
H. *Apex of lvs. rounded or retuse.....* 31. **spathulifolium**
HH. *Apex of lvs. apiculate.* 32. **Palmeri**
DD. *The lvs. commonly much more than twice as long as broad (some specimens of No. 42 have the lvs. only twice as broad as long).*
E. *Margin of lvs. entire.*
F. *Lvs. in rosettes, at least those of the barren shoots.* 33. **obtusatum**
FF. *Lvs. scattered.*
G. *Petals oblong, boat-shaped.....* 34. **nicæense**
GG. *Petals lanceolate.*
H. *Sepals spatulate.....* 35. **formosanum**
HH. *Sepals oblong.....* 36. **japonicum**
EE. *Margin of lvs. dentate or serrate.*
F. *Plant spreading-pilose....* 37 **Selskianum**
FF. *Plant glabrous (sometimes glandular in No. 39).*
G. *The sepals linear or linear-oblong.*
H. *Outline of petals fusiform with the base slightly broadened and the apex long-acuminate.....* 38. **Middendorffianum**
HH. *Outline of petals lanceolate, apex acuminate.....* 39. **hybridum**
GG. *The sepals lanceolate or oblong-lanceolate.*
H. *Petals oblong.....* 40. **asiaticum**
HH. *Petals lanceolate.*
I. *Buds flask-shaped..* 41. **Maximowiczii**
II. *Buds conical.*
J. *Lvs. oblong-ovate: plant about 6–8 in. high.....* 42. **kamtschaticum**
JJ. *Lvs. oblong-lanceolate: plant usually 1½–2 ft. high.....* 43. **Aizoon**
CC. *The fls. white, pink, red, violet, or purple.*
D. *Lf.-blades ¾–1 in. or more broad in the widest place.*
E. *Plants pubescent or puberulent.*
F. *Margin of lf. entire.....* 44. **sempervivoides**

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FF. *Margin of lf. dentate-crenate*.....45. **oppositifolium**
EE. *Plants glabrous.*
F. *Lvs. noticeably petioled*....46. **populifolium**
FF. *Lvs. sessile or nearly so.*
G. *Arrangement of lvs. in whorls of 3*.....47. **Sieboldii**
GG. *Arrangement of lvs. opposite or alternate (rarely in whorls of 3 in No. 49).*
H. *Base of lvs. more or less cordate-clasping*.48. **maximum**
HH. *Base of lvs. more or less cuneate.*
I. *The lvs. opposite, rarely in whorls of 3*.....49. **spectabile**
II. *The lvs. alternate (rarely opposite in No. 52).*
J. *Fls. greenish white; sepals broad-deltoid*...50. **alboroseum**
JJ. *Fls. some shade of pink.*
K. *Margin of lvs. nearly entire*.51. **telephioides**
KK. *Margin of lvs. strongly dentate.*
L. *Blades of lvs. oblong-ovate*.....52. **Telephium**
LL. *Blades of lvs. lanceolate or elongate-lanceolate*.53. **Fabaria**
DD. *Lf.-blades ⅛in. or less broad in the widest place.*
E. *Lvs. of the barren shoots in whorls of 3*.....54. **ternatum**
EE. *Lvs. not in whorls of 3.*
F. *Surface of lvs. densely papillose*.....55. **primuloides**
FF. *Surface of lvs. not densely papillose.*
G. *Arrangement of lower lvs. opposite.*
H. *Petals ovate-oblong*...56. **cyaneum**
HH. *Petals lanceolate to lanceolate-oblong.*
I. *Outline of lvs. suborbicular*.....57. **Ewersii**
II. *Outline of lvs. spatulate or obovate-cuneate*.....58. **stoloniferum**
GG. *Arrangement of lower lvs. alternate (rarely opposite in No. 63).*
H. *Sepals blunt, oblong or linear-oblong.*
I. *Apex of lf. retuse*...59. **Nevii**
II. *Apex of lf. deltoid-acute*.....60. **retusum**
HH. *Sepals acutish, lanceolate.*
J. *The lvs. oblong-spatulate*.....61. **Cepæa**
JJ. *The lvs. more or less orbicular.*
K. *Margin of lf. entire*.....62. **Anacampseros**
KK. *Margin of lf. crenate at the very obtuse apex*.....63. **stellatum**

1. **ácre,** Linn. (*S. negléctum*, Ten.). STONECROP. WALL PEPPER. LOVE ENTANGLE. Fig. 3583. Perennial, glabrous, cespitose: barren sts. creeping, branched, about 2 in. long; fl.-sts. 2–3 in. high: lvs. minute, about ¼in. long, fleshy, ovate, crowded, gibbous at base, sessile: fls. yellow, about ½in. across, in 1-sided cymes, which have 2–5 forks; sepals lf.-like; petals lanceolate. Eu., N. Afr., E. Asia, and naturalized in N. Amer. Gn. 27, p. 316.—This is the commonest native species in England and one of the commonest in cult. Thrives best in poor soil and is a good ledge-plant and is frequently used for covering rather arid spots which would otherwise be bare. The lvs. have an acrid taste. Var. **álbum,** Hort., is a white-fld. form. Var. **aùreum,** Mast., has the lvs. and shoot-tips bright golden yellow in spring. The yellow tint is lost later in the summer, but the variety is never so robust as the green form. Excellent for spring bedding, to give a bit of color. Var. **élegans,** Mast., has the tips and young lvs. pale silvery. More delicate than var. *aureum* and not so effective. Var. **hawaiànum,** Hort., is offered in the trade. Var. **màjus,** Mast., is larger and more robust than the type: lvs. in 7 rows, deltoid-ovoid, scarcely auricled at base: fls. ¾in. across, in a 2-parted cyme, with a central sessile fl.; sepals linear-oblong. Morocco. Var. **Maiveàna,** Hort., is said by the trade to be the same as var. *hawaianum*. Var. **sexangulàre,** Hort., is offered in the trade; it probably is *S. sexangulare*.

2. **Stáhlii,** Solms. Perennial, trailing, much branched, puberulent: sts. green or pinkish; fl.-sts. 4–6 in. high: lvs. opposite or nearly so, sessile, nearly round in cross-section, ovoid or ellipsoid, ¼–½in. long: fls. yellow, 7–9 lines across, in few-branched terminal cymes, the branches of which are recurved; sepals puberulent, linear-oblong; petals lanceolate, with a short dorsal awn just below the apex. Mex.

3. **múlticeps,** Coss. & Dur. Perennial, about 2–6 in. high, base subshrubby, much branched: barren shoots flexuous or erect, bearing dense rosettes of lvs. at their tips; fl.-sts. usually taller, erect: lvs. ⅛–¼in. long, glaucous or pruinose, pinkish and papillose, linear or oblanceolate, subterete: fls. pale yellow, about ½in. across, 5-merous, in many-branched, 2–6-fld., scorpioid cymes; sepals linear-oblong; petals oblong-lanceolate; anthers pale yellow. Algeria. G.C. II. 10:717.

4. **sexangulàre,** Linn.? (*S. ácre* var. *sexangulàre*, Godr. *S. boloniénse*, Lois. *S. Forsteriànum*, Reichb., not Smith. *S. pulchéllum*, Hort., not Michx.). Perennial, glabrous: barren shoots ascending 2–3 in., branched; fl.-st. erect, 2–3 in. high, very slender: lvs. densely crowded in 6–7 rows, about 2 lines long, linear-cylindrical, slightly gibbous at base: fls. yellow, ½in. across, in a 3–5-branched umbellate cyme, 1–3 in. diam.; sepals linear-oblong; petals lanceolate. Eu. The Linnean material probably differs very little from *S. acre*, but the horticultural material (especially the European) may be distinct.

5. **tenuifólium,** Strobl. (*S. amplexicaùle*, DC. *Sempervivum tenuifólium*, Sibth. & Smith). Perennial, glabrous, evergreen: barren branches 2–4 in. long, slender, wiry, ascending; fl.-sts. decumbent, ascending, about 6–9 in. high.: lvs. of the barren shoots dilated and membranous at base, gradually tapering to a long awl-like point; of the fl.-sts. alternate, sessile, ½in. long, terete, with a membranous auricle at base: fls. numerous, golden yellow, secund in 2-forked cymes, with a sessile fl. in the fork; sepals ovate, oblong, acute, united below into a cup-shaped tube; petals oblong-lanceolate, ¼in. long, keeled; filaments greenish, anthers yellow. Medit. region.—There are often 6–10 petals in this species.

6. **stenopétalum,** Pursh. Perennial, tufted, glabrous: sts. 3–6 in. high, erect from a decumbent base: lvs. crowded on the barren shoots, sessile, linear or lanceolate, ½in. long, terete: fls. bright yellow, in much-branched scorpioid cymes; sepals subulate; petals linear-lanceolate, acuminate. Alberta to S. D., Neb., New Mex., and Calif.

7. **sarmentósum,** Bunge. Perennial, glabrous: shoots slender and prostrate: lvs. crowded, opposite or whorled, ½–¾in., linear, terete or slightly flattened: fls. bright yellow, ¼in. across, numerous, in a flat-topped, umbellate, 3–5-forked cyme, with a solitary fl. in the forks; branches recurved, the fls. on the upper surface only;

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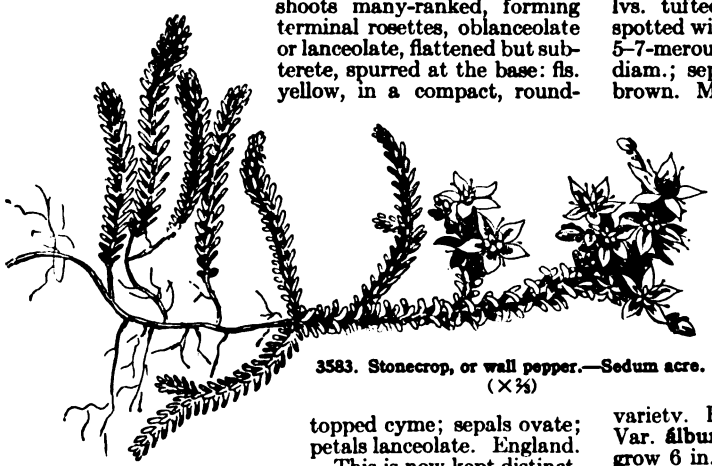
sepals ovate-lanceolate, fleshy; petals lanceolate; stamens yellow. China. Var. **cárneum,** Hort. (*S. cárneum variegàtum*, Hort.), has pink sts.: lvs. with a marginal stripe of white or cream-color.—A good greenhouse plant and also good for edging.

8. **Forsteriànum,** Smith. Perennial, forming small tufts, glabrous or slightly glaucous: lvs. of the barren shoots many-ranked, forming terminal rosettes, oblanceolate or lanceolate, flattened but subterete, spurred at the base: fls. yellow, in a compact, round-topped cyme; sepals ovate; petals lanceolate. England.—This is now kept distinct, but it has been referred to *S. rupestre* and also to *S. pruinatum*, a species which does not seem to be in cult. and it has also been treated as a variety of both these species. Var. **glandulíferum,** Hort., is offered in the trade.



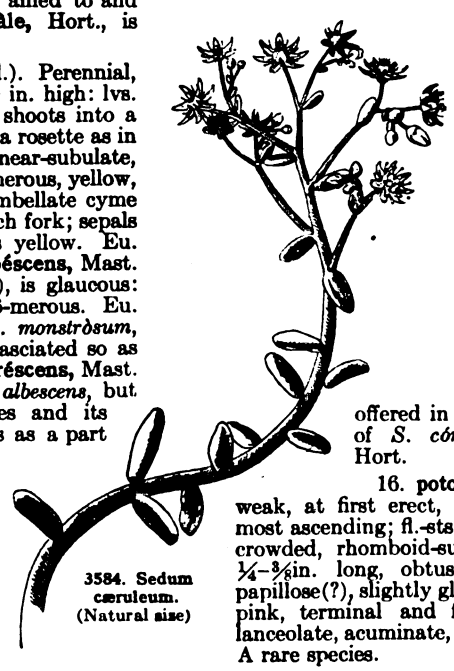
3583. Stonecrop, or wall pepper.—Sedum acre. (×⅔)

9. **rupéstre,** Linn. Perennial, glaucous, reddening with age and drought: barren shoots numerous, creeping, 1–3 in. long; fl.-sts. ascending or erect, 6–12 in. high: lvs. ½in. long, in numerous rows, linear, subulate, incurved, flattened above, forming dense conical rosettes which are ¾–1 in. diam., at the ends of the sterile shoots: fls. numerous, yellow, barely ½in. across, 5–7-merous, in umbellate, 3–5-forked, ultimately hollow-topped cymes; sepals ovate, oblong; petals ovate, oblong; anthers yellow. W. Eu. Closely allied to and confused with *S. reflexum*. Var. **spiràle,** Hort., is offered in the trade.

10. **reflexum,** Linn. (*S. collìnum*, Willd.). Perennial, glabrous: sts. trailing; fl.-sts. erect, 8–10 in. high: lvs. in 6 or 7 rows, crowded on the barren shoots into a conical mass, but not forming so marked a rosette as in typical *S. rupestre*, ½–¾in. long, linear-subulate, reflexed, terete, gibbous at base: fls. 4–8-merous, yellow, ¾in. across, in a decurved, many-fld. umbellate cyme which is many-branched, with a fl. in each fork; sepals oblong-lanceolate; petals linear; anthers yellow. Eu. Also escaped in N. E. N. Amer. Var. **albéscens,** Mast. (*S. albéscens*, Haw. *S. glaùcum*, Smith), is glaucous: lvs. rarely in rosettes: fls. ½in. across, 6-merous. Eu. and N. Afr. Var. **cristàtum,** Mast. (*S. monstròsum*, Hort. *S. robústum*, Hort.), has the sts. fasciated so as to form a crest like a cockscomb. Var. **viréscens,** Mast. (*S. viréscens*, Willd.), is similar to var. *albescens*, but has pale sulfur-yellow fls.—This species and its varieties are treated by some authorities as a part of *S. rupestre*.

11. **ànglicum,** Huds. Perennial, about 3 in. high, glabrous, evergreen: barren shoots trailing or erect, forming dense masses; fl.-sts. about 2 in. high: lvs. crowded, alternate, on the fl.-sts. somewhat opposite and less crowded, ⅛–¼in. long, ovate or ovate-lanceolate, green, becoming red-tinged: fls. white or rosy tinted, about ⅜in. across, in few-fld. dichotomous cymes; sepals ovate; petals lanceolate; anthers red, becoming black. W. Eu. Gn. 79, p. 366.—A good plant for the rockery, though rather difficult to grow.

12. **cærùleum,** Linn.; also spelled *cæràleum* (*S. azùreum*, Desf.). Fig. 3584. Annual, glabrous, or pilose in the infl.: sts. 2–3 in. high, branched from the base: lvs. tufted, ¼in. long, oblong, obtuse, pale green, spotted with red: fls. pale blue to rose-lilac, ¼in. across, 5–7-merous, in a lax, many-fld. cyme, which is 1 in. diam.; sepals oblong; petals oblong; anthers reddish brown. Medit. region. B.M. 2224. B.R. 520. Gn. 27, p. 315.—Said to thrive in a sandy soil, and to be adapted to carpet-bedding.



3584. Sedum cæruleum. (Natural size)

13. **brevifòlium,** DC. Perennial, said to grow about 4 in. high, glaucous, tufted: lvs. crowded in 4 rows, about ⅛in. long, ovoid, subglobose, pinkish, densely mealy pubescent: fls. white, ¼in. across, in an umbellate, 2–3-forked cyme, with a pedicellate fl. in the center of each fork; sepals oblong-lanceolate, whitish with a pink midrib; petals oblong, with a pink midrib; anthers pink. France and Medit. region.—Closely related to *S. dasyphyllum* of which some authorities have made it a varietv. Rather tender and sensitive to root-moisture. Var. **álbum,** Hort., is said to have bronzy lvs. and to grow 6 in. high. Var. **Pŏttsii,** Hort., is offered in the trade as a form with tiny round lvs., covered with white meal.

14. **farinòsum,** Lowe. Perennial, glaucously pruinose, glabrous: sts. tufted, creeping, much branched: lvs. crowded in 4–6 rows, deciduous, ½ x ¼in., oblong, very obtuse: fls. white or flesh-color, nearly sessile, ½in. across, crowded in a 2–3-parted cyme, 5–7-merous; calyx-tube very short, segms. linear-oblong, pink-tipped; petals lanceolate, acute, keeled; anthers purplish brown. Madeira.—Masters says that most of the material cult. under this name is really *S. album*.

15. **dasyphýllum,** Linn. (*S. glaùcum*, Lam.). Perennial, about 2–4 in. high, glabrous: sts. tufted, slender, branching: lvs. crowded, sessile, spreading, oblong-acute or suborbicular, thick, studded with crystalline pimples: fls. white to pinkish, about ⅓in. across, in lax, few-fld., corymbose cymes; sepals oblong, fleshy; petals lanceolate; anthers black. Eu., N. Afr.—The material cult. under the name of *S. glaucum* probably belongs here; see also *S. rupestre* and *S. hispanicum*. Var. **glandulíferum,** Moris (*S. córsicum*, Duby), has minute gray-green lvs. which are more or less densely glandular-pubescent: fls. white. Corsica and N. Afr. B.M. 6027. There is a form of this offered in the trade under the name of *S. córsicum* var. *grandiflòrum*, Hort.

16. **potosìnum,** Rose. Sts. low and weak, at first erect, but soon prostrate or at most ascending; fl.-sts. 2–4 in. high, slender: lvs. crowded, rhomboid-subspherical, nearly terete, ¼–⅜in. long, obtuse, pale green, glabrous, papillose(?), slightly glaucous: fls. white or tinged pink, terminal and few; sepals linear; petals lanceolate, acuminate, widely spreading. Mex.—A rare species.

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17. **pilòsum,** Bieb. (*S. Regèlii,* Hort., not Kuntze). Fig. 3585. Biennial, 2–3 in. high, glandular-pubescent: st. leafy: lvs. ⅓–½in. long, oblong or oblanceolate-oblong; radical densely rosulate; cauline alternate, rather close together: fls. rose-pink, clustered in a corymbose cyme, ¾–1½ in. diam.; sepals oblong; petals elliptic-lanceolate, narrowed to a broad claw; anthers red. Caucasus and Asia Minor. B.M. 8503. G.C. III. 49:347. G.M. 58:37.

18. **villòsum,** Linn. Annual, 3–4 in. high: sts. rather simple, erect, viscid-pilose above: lvs. alternate, subterete, rather remote, linear, obtuse: fls. dull rose or white, in a small, rather loose, few-fld., terminal cyme; sepals ovate and green; petals ovate, rather acute. Alpine and N. Eu.—One of the few species that likes a moist situation, suitable for a bog or similar location.

19. **hispánicum,** Linn. (*S. glaùcum,* Waldst. & Kit., not Smith. *S. pállidum,* Ten., not Bieb.). Annual or biennial (Masters says perennial), glaucous, glabrous or glandular-pilose above: barren shoots 2 in. long, branched; fl.-sts. 3–4 in. high, reddish: lvs. densely crowded, about ¼in. long, linear, greenish gray, becoming reddish, studded with fine hyaline pimples at the tips: fls. 6-merous, pinkish white, in 3–7-branched, umbellate cymes; sepals deltoid; petals oblong, narrowed at base. Cent. and S. Eu., Spain is uncertain.—Commonly grown under the name of *S. glaucum;* see also *S. dasyphyllum* and *S. rupestre.*

20. **arbòreum,** Mast. Perennial, subshrubby, about 4–6 in. high, glabrous, evergreen; branching from near the base, with no separate barren shoots: lvs. of the older shoots deltoid, subulate, terete or somewhat 4-sided, ⅛in. long, horizontally spreading; of the younger shoots more or less crowded, linear, terete: fls. white, 5-merous, about ½in. across, in many-fld. terminal cymes; sepals linear-oblong; petals lanceolate, keeled; filaments white. Hab.(?).

21. **pulchéllum,** Michx. (*S. pùlchum,* DC.). Perennial, glabrous, trailing or ascending: branches slender, 3–6 in. long: lvs. in several rows, linear, scarcely ½in. long, terete, pointed, gibbous at base: fls. rosy purple, ½in. across, in a 3–4-branched cyme, with fls. erect and crowded in 2 rows along the upper surface, each with a leafy bract; sepals lanceolate, obtuse; petals lanceolate; anthers orange. Va. to Ga., Ind., Mo., and Texas. B.M. 6223. Gn. 27, p. 315. G.C. II. 10:685.—The minute lvs. assume rich tints of red, brown, and purple. The branches of the infl. are 3–4 in. long and gracefully arched.

22. **monregalénse,** Balb. (*S. cruciàtum,* Desf.). Perennial, glabrous except the infl., which is glandular: barren shoots spreading, erect, or creeping, 1–4 in. long: lvs. of barren shoots crowded, linear or obovate-oblong, ⅛–¼in. long; those of the flowering shoots scattered, narrower and often spotted pink: fls. white, ¼in. across, 5-merous, in a terminal, lax, many-fld. panicled cyme; sepals deltoid, pink-spotted; petals deltoid-lanceolate, acuminate, pinkish brown beneath; anthers pinkish. N. Italy and Corsica. L.B.C. 5:464.

23. **Álberti,** Regel. Perennial: sts. procumbent, creeping, branched, terete; sterile branches short, densely leafy; flowering much elongated, laxly leafy: lvs. linear-oblong, ¼–½in. long, semi-terete below, glabrous: fls. white, about ½in. across, short-pedicelled, in an erect corymb, dichotomously erect-spreading, branched; sepals elliptic; petals lanceolate. Siberia, Turkestan. G.M. 56:189. Gt. 29:1019.

24. **lydium,** Boiss. Perennial, glabrous, cespitose: barren shoots 2–3 in., erect, reddish; fl.-sts. 4–5 in. high: lvs. crowded, ¼in. long, linear, subterete, greenish or red-tipped, base auricled, with numerous fine pimples at the tip when seen under a lens: fls. pinkish, ⅓in. across, in a many-fld., corymbose cyme; buds 5-angled; sepals oblong, reddish; petals lanceolate, rather obtuse; anthers reddish. Asia Minor. G. 37:25.—A good plant for rockeries. Some of the material grown in gardens as *S. pulchellum* and *A. anglicum* are really this species. Var. **aùreum,** Hort., was offered in the trade. Var. **glaùcum,** Hort., is offered in the trade as a glaucous-lvd. form.

25. **álbum,** Linn. Perennial, about 4–6 in. high, glabrous, cespitose: barren sts. erect or creeping, rooting, olive-brown; fl.-sts. erect, pinkish: lvs. alternate, spreading, linear-oblong, about ½in. long, obtuse: fls. white, about ¼in. across, in corymbose cymes, which are much branched, about 2–3 in. diam.; calyx-tube cup-shaped, segms. broadly ovate to subrotund, obtuse; petals lanceolate; anthers reddish. Eu., Temp. Asia, and N. Afr. Gn. 27, p. 315. G.M. 57:469.—Some of the plants grown as *S. neglectum* probably belong to this species.

26. **Kirilòwii,** Regel. Perennial, rhizome destitute of shoots of preceding years, green, glabrous: sts. up to 1½ ft. high, slender: lvs. spreading, elongate-linear, 2–3 in. long, attenuate, more or less serrate toward the tip: fls. dicœcious, yellow, 5-merous, rather small, in a dense, many-fld., corymbose cyme, which is commonly leafy; sepals and petals linear. Soongaria, China, and Turkestan.—Allied to *S. roseum.*

3585. Sedum pilosum. (×¼)

27. **ròseum,** Scop. (*Rhodìola ròsea,* Linn. *S. Rhodìola,* DC.). Perennial, 4–8 in. high: rootstock thick, fleshy, exhaling a perfume of rose-water: sts. annual, several from the same stock, erect and unbranched: lvs. scattered, glaucous, 1 x ¼in., sessile, flat, spatulate, obovate or oblong, obscurely 1-nerved, slightly toothed at apex: fls. dicœcious, greenish or reddish purple, in a terminal flat-topped, subglobose cyme, about 1 in. diam.; sepals 4, lanceolate or oblong; petals 4, linear-oblong; stamens 4 in the male, lacking in the female fls. Eu., N. Amer., and Himalaya. Gt. 12:403 (as var. *lanceolatum*). B.B. (ed. 2) 2:207.—A neat-growing species well adapted to the rockery. Var. **linifòlium,** Hort., is offered in the trade.

28. **dendroídeum,** Moç. & Sessé. Shrub, 4–12 in. high, much branched, smooth: lvs. flat, fleshy, obovate or spatulate, sessile, ¾–1½ in. long: fls. sessile or nearly so, bright yellow, in a paniculate cyme, numerous; calyx-lobes ovate; petals lanceolate. Mex.

29. **Wòòdwardii,** N. E. Br. Perennial, glabrous: sts. simple, about 1 ft. high, green: lvs. alternate, lax, 1½–2½ x ¾–1¼ in., obliquely cuneate-obovate, irregularly and obtusely dentate above, green, flat: fls. yellow, sessile, about ½in. across, in dichotomously branched, 2–5-parted, rather flat, rather lax cymes, which are 2½–4 in. diam.; sepals linear-subulate; petals lanceolate. China(?).—Resembles *S. Aizoon,* but differs in the obliquely obovate, obtusely toothed lvs. and larger, looser cymes.

30. **oregànum,** Nutt. (*Gormánia oregàna,* Brit.). Perennial, glabrous: fl.-sts. erect, simple, 3–6 in. high: lower lvs. about ¾in. long, all spatulate-cuneate, rounded at apex: fls. yellow, changing with age to pink, in a compound cyme; sepals lanceolate to ovate-lanceolate; petals linear-lanceolate, long-acuminate, more than ½in. long. Alaska to N. Calif.

31. **spathulifòlium,** Hook. Fig. 3586. Perennial with slender rootstocks, glaucous, ultimately reddish: barren shoots creeping or ascending, 3–4 in. long; fl.-sts.

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ascending, sometimes 4–8 in. high, simple or sometimes branched: lvs. of barren shoot forming a terminal rosette 1–1½ in. diam. and producing offsets from the base; lower lvs. obovate-spatulate, ½ x ⅜in.; cauline smaller and clavate: fls. numerous, yellow, ½in. across, in terminal forking cymes, with 3–5 principal branches about 3 in. long, these are 2-divided and bear fls. only on the upper side; sepals lanceolate or oblong-lanceolate; petals lanceolate, keeled; anthers yellow. N. W. N. Amer. G.C. II. 5:821; 10:377. Gn. 24:462. Gt. 21:741.—Questionable whether it is hardy in the E.

32. **Pálmeri,** Wats. Perennial, caulescent, about 6 in. high, erect and branching, glabrous and glaucous: lvs. thick, flattened, 1–1½ x ¾in., spatulate-obovate, slightly apiculate: fls. deep orange, in a racemose panicle whose branches are 1–2 in. long; sepals narrowly lanceolate; petals narrowly lanceolate. Mex.

33. **obtusàtum,** Gray (*Gormánia obtusàta*, Brit.). Perennial, glaucous or green: sts. prostrate or ascending, 2½–6 in. high; fl.-sts. erect, terete, reddish, ultimately leafless: lvs. rosulate, 1 x ⅜in., spatulate, entire, glaucous, becoming reddish green: fls. yellow, ¼in. across, in terminal, spreading, umbellate cymes, 1½–2 in. diam.; sepals oblong-acute; petals lanceolate; anthers yellow. Calif.

34. **nicæénse,** All. (*S. ochroleùcum*, Chaix. *S. altissimum*, Poir.). Perennial, glabrous and glaucous: rootstock thick and woody: sts. 6–8 in. long, at first prostrate, afterward ascending; fl.-sts. erect, 10-12 in. high: lvs. of barren shoots ascending or spreading, ½–¾in. long, glaucous, reddish when old, ovate-lanceolate or oblanceolate, scarcely auricled; of flowering shoots appressed, lanceolate, distinctly auricled: fls. greenish yellow, 5–6-merous, ½in. across, in terminal many-fld., leafless umbellate cymes; sepals deltoid-lanceolate; petals oblong, boat-shaped; anthers yellow. Medit. region. G.M. 57:473.—*S. ochroleucum* is kept distinct by some but does not seem to differ very much.

3586. Sedum spathulifolium. (×⅓)

35. **formosànum,** N. E. Br. Annual, about 6 in. high, glabrous: st. repeatedly dichotomously or trichotomously branched from near the base, indistinctly 4-sided: lvs. 1–3 in whorls at the branchings of the sts., with 1–3 on the long internodes, 1–1¼ x ⅓in., flat, spatulate: fls. sessile, yellow; sepals green, fleshy, spatulate; petals lanceolate; anthers at first red, finally black. Formosa.—Intro. into S. Calif.

36. **japónicum,** Sieb. Perennial, 4–6 in. high, glabrous: sts. diffuse: lvs. scattered or opposite, elliptical to spatulate, flat and somewhat reticulate veined, entire, bright green, channeled above: fls. yellow, ½in. across, in loose, terminal and lateral, panicled, many-fld. cymes; sepals oblong; petals lanceolate. Japan.—It is extremely doubtful whether this species is or has been common in cult.; most of the material so named is probably *S. alboroseum*. Var. **aûreo-marginàtum,** Hort., probably is the same as *S. kamtschaticum* var. *aureo-marginatum*. Var. **macrophýllum,** Hort., is offered in the American trade as a compact bush, 15 in. high, with waxy white fls., the centers of which are light pink; presumably this is also *S. alboroseum*. Var. **variegàtum,** Hort., mentioned in American trade is presumably *S. alboroseum* var. *variegatum*, which is a large-lvd. plant with decided yellow-blotched lvs.

37. **Selskiànum,** Regel & Maack. Perennial, spreading, pilose: sts. 1–1½ ft. high, erect: lvs. sessile, ascending, upper 1½ by less than ½in., lanceolate from a broad base, ciliate, apical third serrate-margined: fls. numerous, yellow, about ¼in. across, in a many-branched terminal cyme which is hollow-topped and leafy; sepals linear; petals lanceolate; anthers yellow. Amurland, Manchuria. Gt. 11:361.—Close to *S. Aizoon*, but differs in the pilose sts. and the narrower and pilose lvs.

38. **Middendorffiànum,** Maxim.; also spelled *Middendorfii*. Perennial, 4–16 in. high, cespitose, glabrous: lvs. ½ to nearly 3 in. long, lowest spatulate; the rest linear-spatulate, upper part serrate, upper surface channeled: fls. yellow, ⅜–⅝in. across, in many-fld. cymes; sepals linear-oblong; petals fusiform, base rather broad, apex long-acuminate; anthers dark purple. Amurland.—Some of the taller material grown under this name probably does not belong to this species. Var. **hýbridum,** Hort., a form said to have fine autumn tints, is offered in the trade.

39. **hýbridum,** Linn. Perennial: sts. creeping, glabrous or glandular: lvs. alternate, petioled, about 1 or more by ½in., spatulate, upper half coarsely toothed, lower part entire and tapering; teeth red-tipped: fls. numerous, yellow, in terminal, much-branched, umbellate, inversely pyramidal cymes which are 2–3 in. diam.; sepals linear; petals apiculate; anthers orange. Siberia and China.

40. **asiáticum,** Spreng. (*S. Wallichiànum*, Hook.). Perennial, 6–12 in. high: sts. annual, erect, unbranched, glabrous, slender: lvs. opposite, decussate, sessile, ¾–1 in. long, linear, oblong, coarsely and irregularly toothed: fls. numerous, greenish yellow, bisexual, in compact, terminal, globose cymes; sepals oblong-lanceolate; petals oblong; anthers orange-brown. Himalayas.—Readily distinguished by its almost pinnatifid foliage. In India the fls. are said to be sometimes red. It seems to suffer from wetness in winter and probably should be wintered under glass or otherwise protected from the wet.

41. **Maximòwiczii,** Regel. Perennial, about 1 ft. high, glabrous: sts. erect, terete or somewhat 4-sided, greenish: lvs. subopposite or alternate, subsessile, 1–1½ in. long, oblong-ovate or oblong-lanceolate, regularly toothed; upper lvs. longer and narrower: fls. yellow, numerous, in a dense flat spreading cyme; buds flask-shaped; sepals unequal in size, lanceolate, rarely somewhat spatulate at apex; petals lanceolate. Japan, Amurland. Gt. 15:528. Gn. 19, p. 203; 27, p. 316.—Similar to *S. Aizoon* and by some considered a variety of it. Differs in having unequal sepals and the peculiar flask-shaped buds. A good border plant. *S. Lèhmannii* of some gardens belongs here.

42. **kamtscháticum,** Fisch. & Mey. Perennial, glabrous: branches 6–10 in. long, greenish or pinkish; fl.-sts. erect, 4–6 in. high: lvs. alternate or opposite, about 1¾ x ½in., oblong-ovate, deep green, coarsely but regularly toothed above the middle, tapering gradually to the petiole: fls. numerous, yellow, ¾in. across, in terminal, umbellate inversely pyramidal cymes which are 1–3 in. diam.; sepals greenish, deltoid; petals lanceolate, apiculate, keeled; anthers subglobose, orange. Kamschatka, Korea, and Japan. Var. **aûreo-marginàtum,** Hort., is offered in the trade; *S. japonicum* var. *aureo-marginatum* probably is the same thing. Var. **variegàtum,** Hort., is offered in the trade as having variegated lvs. and yellow fls. By some dealers the fls. of the plants are said to be purple and the material so named is undoubtedly misnamed and is probably some form of *S. Telephium* or one of its close allies.

43. **Aizòon,** Linn. Perennial, glabrous, 1 ft. or more high, usually 1½–2 ft.: sts. several, unbranched, erect, subangular: lvs. alternate, sessile, distant, oblong-lanceolate, 2½ x ¾in., coarsely and irregularly toothed:

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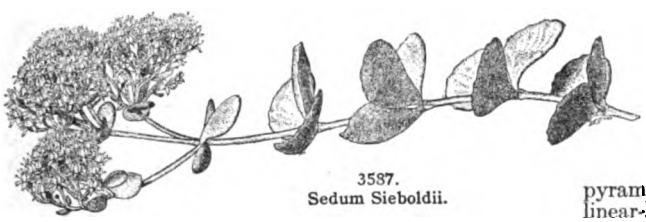
fls. numerous, yellow, ½in. across, in a loose panicled cyme, 1–3 in. diam.; sepals lanceolate; petals lanceolate. Siberia.—An old garden plant, suitable for rockeries or borders.—Some of the material grown as *S. Wallichianum* probably is this species.

44. **sempervivoìdes,** Fisch. (*S. Sempervìvum*, Ledeb.). Biennial, pubescent, 2–8 in. high: basal lvs. in a rosette of 40–50, obovate, cuneate, pubescent and ciliate, about 1 x ¾in., cauline clasping, greenish red, oblong, acute:



3587.
Sedum Sieboldii.

fls. scarlet, in a many-fld., panicled cyme, which is 2–4 in. diam.; sepals deltoid, acute, pilose; petals lanceolate, ¼in. long. Asia Minor and Caucasus. Gt. 16:551; 33:1155. Gn. 19:354. R. H. 1846:5.—Apparently rare in cult., but said to be very showy; the fl.-color is almost unique in the genus.

45. **oppositifòlium,** Sims. Perennial, trailing, puberulent: fl.-sts. erect, 6 in. high: lvs. opposite, decussate, 1½ x ¾–1 in., obovate-spatulate, dentate-lobulate or crenate, slightly puberulent: fls. white, ½–¾in. across, in a terminal dichotomous cyme; sepals lanceolate; petals oblong-lanceolate; anthers orange according to Masters. Caucasus and Persia. B.M. 1807 (anthers shown as yellow).—Closely allied to *S. stoloniferum*, but the lvs. are brighter green and more regularly decussate.

46. **populifòlium,** Pall. Subshrub, with fibrous roots, glabrous: sts. 6–10 in. high, greenish or purplish, slender, branched: lvs. alternate, distant, 1½ x 1 in., petioled, ovate, acute, base cordate, coarsely and irregularly toothed; petiole ¾–1¼ in. long: fls. numerous, nearly ½in. across, whitish or pinkish, in terminal, much-branched, corymbose cymes; sepals lanceolate; petals lanceolate, 1-nerved; anthers purple. Siberia. B.M. 211. Gn. 27, p. 316. R.H. 1857, p. 150.—Readily distinguished by the long-petioled, poplar-like lvs. A good border or rockwork plant, also useful as a pot-plant.

47. **Sièboldii,** Sweet. Fig. 3587. Subshrubby, 6–8 in. high, glaucous: branches terete, slender, purplish, erect, afterward decurved: lvs. in whorls of 3, sessile or nearly so, suborbicular, sinuate, about ¾–1 in. diam., bluish green, margins pinkish, base cuneate: fls. pink, ½in. across, numerous, in much-branched umbellate cymes; sepals ovate-acute; petals lanceolate; anthers pinkish. Japan. B.M. 5358. G. 34:831.—Very useful for rockeries and borders. Var. **variegàtum,** Hort. (*S. variegàtum*, Hort., not Wats. *S. Sièboldii spléndens variegàtum*, Hort.), has white variegated lvs. I.H. 10:373 (lvs. green-margined, center yellow).

48. **màximum,** Suter (*S. macrophýllum*, Hort. Vilm.). Perennial, stout and bushy: sts. 1–2 ft. high, erect, green or purple: lvs. opposite, sessile, spreading, st.-clasping, 2½ in. long, ovate-acute, more or less cordate, crenate or dentate: fls. whitish, in terminal and lateral cymes, on long peduncles, forming a loose panicle; cymes rather globose and many-fld.; sepals deltoid-lanceolate; petals lanceolate, with the tips spotted with red; anthers reddish, projecting. Eu., Caucasus, and N. W. Asia. Gn. 27, p. 316.—A very variable species and occurs in many forms. A fine border plant, but is apt to become straggly in the fall and to need support. Var. **hæmatòdes,** Mast. (*S. atropurpùreum*, Hort., not Turcz. *S. màximum* var. *atropurpùreum*, Hort. *S. macrophýllum* var. *atropurpùreum*, Hort.), has sts. erect, glabrous, 1½–2½ ft. high; lvs. opposite, oblong-ovate, bronzy or dark purple; petals whitish, red-tipped. G.C. II. 10:337. Var. **purpùreum,** Hort. (*S. macrophýllum* var. *purpùreum*, Hort.), is a purple-lvd. form questionably different from the preceding variety. Var. **variegàtum,** Hort., has been offered in the trade as a form with green-and-gold foliage. Var. **versícolor,** Van Houtte (*S. Rodigàsii*, Hort.), is a form with pink sts. and lvs. heavily variegated with white, their margins pink. F.S. 16:1669.

49. **spectàbile,** Bor. (*S. Fabària*, Hort., not Koch). Showy Sedum. Fig. 3588. Perennial, robust and glaucous: sts. 18–24 in.: lvs. opposite, decussate or in whorls of 3, 3x2 in., flat, scarcely petioled, ovate or spatulate, entire or obscurely sinuate-dentate: fls. numerous, ½in. across, pink, in large flat-topped, inversely pyramidal, leafy and umbellate cymes; sepals whitish, linear-lanceolate; petals slightly concave; anthers orange. Japan(?). Gn. 27, p. 315. I.H. 8:271. Gt. 21:709.—The fls. are said to vary from rose to purple and perhaps to white. This is the showiest of the sedums and is an excellent border and garden plant. It is said to thrive best in stiff clay and not to do so well in lighter soils. Var. **álbum,** Hort., a white-fld. form is offered in the trade. Var. **atropurpùreum,** Hort., is a form with rosy crimson fls. Var. **purpùreum,** Hort., is offered in the trade. Var. **ròseum,** Hort., is offered in the trade. Var. **rùbrum,** Hort., is a form with crimson fls. There is also a form with variegated lvs.

50. **alboròseum,** Baker (*S. erythrostíctum*, Mast., not Miq. *S. japónicum*, Hort., not Siebold. *S. macrophýllum*, Hort., not Hort. Vilm.). Perennial, glaucous: sts. several, ascending, about 1½ ft. high, glabrous: lvs. up to 2½ x 1¼ in., alternate in 4 ranks, slightly convex below, oblong-spatulate, upper margin incised-crenate: fls. greenish white, in a dense corymbose cyme, 3–4 in. diam.; sepals deltoid; petals lanceolate; anthers pinkish: carpels rosy pink. Japan. Gt. 21:709.—A fine plant for the border or rockery. Var. **variegàtum,** Hubb. (*S. erythrostíctum* var. *variegàtum*, Mast. *S. japónicum* var. *variegàtum*, Hort. ex W. Mill.), has the lvs. irregularly blotched yellow in the center. Gt. 21:709.

51. **telephioìdes,** Michx. Perennial, glabrous: sts. 6–10 in. high: lvs. scattered, 2 x 1 in., oblong or obovate, nearly entire or sparingly toothed, base cuneate: fls. numerous, flesh-colored, in small, dense, compound cymes, 1–1½ in. diam.; sepals lanceolate; petals lanceolate, falcate, hooded at the tip. S. Pa. to W. N. Y., to S. Ind., N. C., and Ga.—Not common in cult.

52. **Telèphium,** Linn. Orpine. Live-forever. Fig. 3589. Perennial: sts. erect, 12–18 in. high: lvs. scattered, rarely opposite, 2–3 x 1–1¼ in., oblong-ovate, dentate; lower wedge-shaped at base; upper somewhat rounded: fls. numerous, pink, red-spotted or sometimes pure white, in dense terminal and lateral, pedunculate cymes; sepals lanceolate; petals lanceolate, 2–2½ lines long, somewhat recurved. Cent. Eu. to Siberia and naturalized in N. Amer.(?). (The American material may be another species which it is almost impossible to distinguish horticulturally, namely *S. purpureum*, Tausch., and which is referred to *S. Telephium* by many authors.) Var. **Bórderi,** Mast. (*Anacámpseros Bórderi*, Jord. & Fourr. *S. Bórderi*, Hort. *S. Anacámpseros* var. *Bórderi*, Hort.), has reddish sts.: lvs. distinctly petioled, oblong, tapering at base: fls. pink, in

3588. Showy sedum.—Sedum spectabile. Clusters 4 inches across.

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a flat-topped, corymbose cyme. Var. **hýbridum,** Hort., is offered in the trade. Var. **purpuráscens,** Hort., is offered in the trade. Var. **purpûreum,** Hort. (not to be confused with *S. purpureum,* Tausch.), is offered in the trade as a purple-lvd. form; very possibly this is the same as *S. maximum* var. *purpureum.* Var. **rûbrum,** Hort., is offered in the trade.—The species and all of its varieties are excellent border and garden plants, also well adapted to the richer parts of the rock-garden. A very variable and confusing species.

3589. Live-forever.—Sedum Telephium. (×½)

53. **Fabària,** Koch (*S. Telèphium* subsp. *Fabària,* Mast.). Perennial: sts. upright, 8–16 in. high: lvs. grass-green, alternate, flat, elongate-lanceolate or lanceolate, dentate-serrate, base cuneate, lower petioled: fls. lilac-purple, smaller than those of *S. Telephium,* in a dense, terminal cymose corymb; buds 5-angled; sepals lanceolate; petals lanceolate. Cent. Eu.—Very close to *S. Telephium* and botanically speaking probably only a well-marked variant of that species, but horticulturally fairly distinct, as the lvs. are narrower and the fls. smaller.

54. **ternâtum,** Michx. Fig. 3590. Perennial by rootstocks, glabrous, tufted: barren shoots 6–8 in. long, prostrate and creeping; fl.-sts. erect: lvs. ½in. long, in whorls of 3, flat, obovate to suborbicular spatulate, crowded in rosettes at end of the barren shoots; those of the fl.-sts. scattered, oblong, acute: fls. white, ½in. across, 4-merous, in 1-sided, leafy, terminal, 3–5-parted cymes; sepals oblong; petals oblong, acute; anthers reddish. N. Y. and N. J. to Ga., Ind., Mich., and Tenn. B.M. 1977. B.R. 142. G.M. 57:840.

55. **primuloìdes,** Franch. Rhizome thick, branched: branches of st. short and fastigiately clustered: lvs. clustered in a terminal rosette, densely papillose, more or less long-petioled, broad-spatulate, 5–10 lines long including the petiole, entire: peduncles 1-fld., short: sepals narrowly lanceolate; petals white, broadly ovate, about ⅛in. long. China. G.M. 57:212.—Apparently rare in cult.

56. **cyàneum,** Rudolph. Perennial, 2–3 in. high, glaucous, lilac above: sts. solitary or cespitose: lvs. opposite, few, entire, glabrous; radical oblong or obovate-oblong, somewhat rosulate; cauline oblong- or oblong-linear: fls. purplish pink, about ¼in. across, in a simple or compound corymbose cyme; sepals lanceolate; petals ovate-oblong. Siberia. Gt. 27:972.

57. **Êwersii,** Ledeb. (*S. azùreum,* Royle not Desf.). Perennial, glabrous: st. thick, giving off many trailing or ascending shoots, rather woody at base, 4–12 in. high: lvs. opposite, sessile, about ½–1 in. diam., suborbicular, cordate, amplexicaul, entire or slightly sinuate: fls. numerous, pink or pale violet, in dense globose cymes; sepals linear-lanceolate; petals oblong-lanceolate; anthers purplish. Siberia, N. India, Kashmir, and Thibet. Gt. 9:295.—Said to be tender, but well worth pot-culture. Var. **turkestánicum,** Hort., is said to grow 4 in. high and to have deep violet fls. and furthermore to be hardy in Mass.; little known to gardeners.

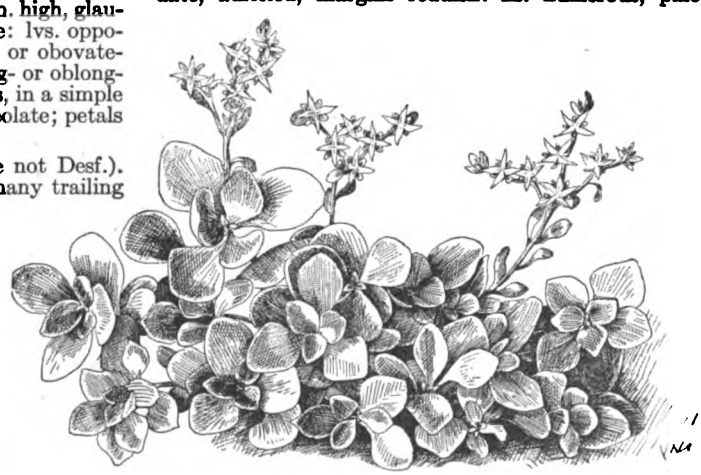
58. **stoloníferum,** Gmel. (*S. ibéricum,* Stev. *S. spùrium,* Bieb.). Perennial: barren shoots trailing, glabrous, rooting at the nodes; fl.-sts. ascending, 6 in. high, reddish: lvs. opposite, ¾–1¼ in. long, spatulate or obovate-cuneate, coarsely toothed above, short-petioled: fls. numerous, ½–¾in. across, pink or white, in terminal umbellate cymes, 2 in. diam.; sepals linear-oblong; petals lanceolate; anthers reddish, speckled. Asia Minor and Persia, also escaped in N. Maine and Newfoundland. B.M. 2370. Gn. 27, p. 315. R.H. 1891, p. 523.—*S. spùrium,* Bieb., is maintained as a species by some authorities, but there seem to be no good characters by which to distinguish it. A showy species, common in European gardens and well adapted to rockeries. Var. **coccíneum,** Hort. (*S. spùrium* var. *coccíneum,* Hort.), is offered, in the trade.—The following trade names also appear: *S. spùrium* var. *álbum,* Hort., *S. spùrium* var. *ròseum,* Hort., *S. spùrium* var. *rùbrum,* Hort., and *S. spùrium* var. *spléndens,* Hort.

59. **Nèvii,** Gray. Perennial, cespitose, tufted, glabrous: barren shoots prostrate; fl.-sts. erect, 2–5 in. high: lvs. of barren shoots crowded in terminal rosettes, ¾ x ⅜in., alternate, obovate-spatulate, tapering to a short petiole, auricled at the base, sprinkled with pink dots; those of the fl.-sts. scattered, alternate, similar, but appressed: fls. numerous, white, nearly ½in. across, in forked cymes whose branches are 1–1½ in. long and recurved; sepals greenish, oblong; petals lanceolate; anthers brownish purple. Mountains of Va. to Ala. and Ill., but hardy as far north as Mass. B.B. (ed. 2) 2:210.

60. **retûsum,** Hemsl. Shrubby, glabrous: branches thick and fleshy: lvs. alternate, small, about ½in. long, oblong-oval or spatulate, sessile, flat, fleshy, usually retuse: fls. white, subsessile, in a few-fld. cyme; sepals linear-oblong; petals oblong, acute, keeled on the back. Mex.

61. **Cepàea,** Linn.; also spelled *cæpium.* Annual, 10–12 in. high, glabrous: sts. tufted, simple or loosely branched: lvs. alternate, ½–¾ x ½in., oblong-spatulate, narrowed to the petiole; cauline opposite, whorled or scattered, narrower: fls. white, ¼–½in. across, in a loose many-fld. paniculate cyme which has purple-spotted, spreading branches; calyx-tube very short, sepals lanceolate; petals lanceolate, with pink midnerves and often a few pinkish spots; anthers purplish. W. and S. Eu.—Cult. specimens are sometimes said to be pink-fld.

62. **Anacámpseros,** Linn. (*S. rotundifòlium,* Lam.). Perennial, glaucous, evergreen: branches terete, rooting at the nodes; fl.-sts. erect, reddish, about 6–8 in. high: lvs. alternate, orbicular or obovate-obtuse, cordate, auricled, margins reddish: fls. numerous, pale



3590. Sedum ternatum. (×½)

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violet, ¼in. across, in dense, terminal, globose cymes; sepals lanceolate; petals oblong-lanceolate. Cent. Eu. B.M. 118.—Suitable for edging and rockeries, but the fls. are comparatively rarely produced. Var. **Börderi,** Hort., equals *S. Telephium* var. *Borderi.*

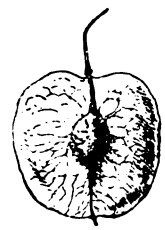
63. **stellàtum,** Linn. Annual, glabrous: sts. erect, 3–4 in. high, branched at the base: lvs. of the barren shoots in a rosette, suborbicular, crenate, flat; cauline alternate or rarely opposite, petioled, ¼–½in. long, obovate, crenate: fls. reddish or purplish, in lax, few-fld., terminal cymes; sepals lanceolate; petals lanceolate. S. Eu.—Probably rare in cult.

S. Àdolphii, Hamet. Perennial: fl.-sts. erect, robust, branched: lvs. alternate, sessile, obovate, lanceolate, or broadly obovate, ¾–1¼ in. x 6–7 lines, flat, entire: fls. in a rather dense corymbose cyme; sepals broad-deltoid; petals ovate-lanceolate. Mex.—*S. álbidum,* Hort., is offered in the trade as a form growing 6 in. high, with white fls.—*S. allantoides,* Rose. Perennial, 8–12 in. high, woody below: lvs. almost at right angles to the st., terete, clavate and somewhat bowed, glaucous: fls. greenish white, in an open terminal panicle; sepals ovate, acute; petals lanceolate, acute. Mex. —*S. atrosanguíneum,* Hort., is offered in the trade.—*S. béllum,* Rose (S. farinosum, Rose, not Lowe). Perennial plants, at first forming dense elongated rosettes: fl.-st. weak, ascending or spreading: lvs. flat but thickish spatulate: infl. a broad open cyme; petals white, spreading, lanceolate. Mex. In its wild state this species grows on cliffs among mosses. It has been in cult. in Washington since 1906, and deserves a place in every good succulent collection. —*S. Braùnii,* Hort., is offered.—*S. Bròwnii,* Hort., is offered in the trade.—*S. caldbricum,* Ten., is a name without description applied to some Italian species which is offered in the trade.—*S. coccíneum* Hort., not Royle, is a name mentioned in horticulture; possibly it is S. stoloniferum var. coccineum.—*S. Còckerellii,* Brit. Perennial, 8 in. or less high, glabrous, branched: basal lvs. not known; cauline lanceolate to oblong-lanceolate, ½–1 in. long, sessile, acute: fls. white, subsessile, in cymes which are ¾–2½ in. diam.; sepals nearly linear; petals linear-lanceolate to linear-oblanceolate; anthers and styles pink. New Mex. This species is in cult., but cannot be placed in the key owing to lack of sufficient data.—*S. crassifòlium,* Hort., is offered in the trade.—*S. cristagálli,* Hort., is offered.—*S. cruéntum,* Hort., is offered in the trade.—*S. diversifólium,* Rose. Perennial: barren shoots short; fls.-sts. elongated, weak: lvs. of barren shoots flattened ovate, small, rough, somewhat recurved: fls. pale yellow, terminal, solitary, short-peduncled; sepals obtuse; petals ovate, acute or even apiculate. Mex.—*S. Douglasii,* Hook., grows 4 in. high: lvs. lanceolate, ¼–½in. long, acute, and has yellow fls.; probably not in cult.—*S. Dúrgidum,* Hort., is offered in the American trade as a compact grower and bright green; not known botanically.—*S. Eichldmii,* Hort., is offered in the trade.—*S. glaùcum* var. *aùreum,* Hort., is offered as a golden yellow variety; not placed satisfactorily.—*S. grandiflòrum,* Hort., is offered as a strong grower with yellow fls.—*S. himaldicum,* Hort., is offered as a form with rich yellow fls.; not known botanically.—*S. Mawednum,* Hort., is offered as growing 4 in. high: fls. yellow.—*S. murdlis,* Hort., is said to have dark lvs. and white fls. with a pink center; not known botanically.—*S. níveum,* Hort., is offered in the trade.—*S. pállidum,* Bieb. Perennial, glabrous or glandular-pubescent above: sts. usually branched: lvs. semi-terete, linear, rather obtuse: fls. white or rose in a lax branched scorpioid cyme; sepals triangular, acute: petals puberulent, cuspidate. Asia Minor, Persia, and India. Closely allied to S. hispanicum. This is the true species but the name has also been applied to several other plants and it is uncertain which form is in cult.—*S. pállidum* var. *róseum,* Hort., is in the trade but cannot be satisfactorily identified. —*S. pruindtum,* Brot. Perennial, glaucous, pruinose: barren shoots 6–8 in. long, trailing and ascending; fl.-sts. erect, 1 ft. high: lvs. in many rows, sessile, more or less terete, glaucous, tips often rose-pink, about ¾in. long, linear-oblanceolate, aristate: fls. bright yellow, ½in. across, in an umbellate, many-branched, flat-topped cyme; sepals oblong, acute; petals oblong, obtuse. Eu. Closely allied to S. rupestre and included in it by some authorities.—*S. ramiflòrum,* N. E. Br. Perennial: sts. numerous, decumbent, up to 6 in. long, glabrous: lvs. alternate, flat above, slightly convex beneath, ¾–1½ in. long, linear, acute, green: fls. white, in a lax 2–3-branched infl.; sepals spreading, linear, acute; petals oblong-lanceolate, acuminate. China.—*S. retrorsum,* Hort., is offered in the trade.—*S. Sempervivum,* Hort., not Ledeb.=Cotyledon Sempervivum.—*S. sexemifidum,* Hort., is offered in the trade; perhaps an error for sexifidum which is a synonym of S. hispanicum.—*S. spathulátum,* Hort., is a trade name of a species said to grow several feet high, botanically unknown.—*S. speciòsum,* Hort., is still offered in the trade, but is unknown botanically. Var. *rùbrum,* Hort., is offered in the American trade as growing 6 in. high and having dark red fls. in July. Var. *splèndens,* Hort., is offered as a form growing 6 in. high, with deep red fls.—*S. tectòrum,* Scop.=Sempervivum tectorum.—*S. turkestànum,* Hort., is possibly a trade error for turkestanicum which is a variety of S. Ewersii.—*S. undulátum,* Hort., is offered in the trade.

F. Tracy Hubbard.†

SEEDS AND SEEDAGE. A seed is a ripened embryo, and its integuments and storage supplies, resulting from fertilization in the flower. Seedage is a term used to include all knowledge respecting the propagation of plants by means of seeds or spores. The word was first used, so far as the writer is aware, in 1887. It is equivalent to the French *semis,* and is comparable with the words graftage, layerage, and cuttage. See *Spores.*

In general literature and common speech, a seed is that part of the plant which is the outcome of flowering and which is used for propagating the species. In the technical or botanical sense, however, the seed is the ripened ovule. The seed contains an embryo, which is a miniature plant. The embryo has one or more leaves (cotyledons), a bud or growing-point (plumule) and a short descending axis (caulicle). From the caulicle or stemlet, the radicle or root develops. This embryo is a minute dormant plant. Each embryo is the result of a distinct process of fertilization in which the pollen of the same or another flower has taken part. The ovule is contained in the ovary. The ripened ovary is the seed-case or pericarp. The pericarp, with the parts that are amalgamated with it, is known technically as the fruit. In many cases there is only one seed in the fruit; and the seed and its case may adhere and form practically one body. Many of the so-called seeds of horticulturists are really fruits containing one or few seeds. Such are the seeds of beet, lettuce, and sea-kale. The winged seeds of elms, hop-tree (Fig. 3591), and ashes are really fruits containing a single seed. Acorns, walnuts, butternuts, and chestnuts are also fruits; so are grains of corn, wheat, and the "seeds" of strawberry. The keys of maple are double fruits, with two seeds (Fig. 3592). Beans and peas are true seeds; the fruit part is the pod in which they are borne. Seeds of apples and pears are also true seeds, the fruit being the fleshy part that surrounds them.



3591. Seed-like fruit of hop-tree. (Natural size)

Germination is the unfolding and the growing of the dormant or embryo plant. The first visible stage in germination is the swelling of the seed. Thereafter the integument is ruptured, and the caulicle appears. When the caulicle protrudes, the seed has sprouted; and this fact is taken as an indication that the seed is viable (Fig. 3593). Germination is not complete, however, until the young plant has made vital connection with the soil, has developed green assimilative organs and is able to support itself (Fig. 3594). See, also, Figs. 5395 and 3596. Seeds that have sufficient life to

3592. Natural planting of maple seeds.

sprout may still be too weak to carry the process to complete germination. The ideal test for the viability of seeds is to plant them in soil in conditions that somewhat nearly approach those in which they are finally to be planted. This test eliminates the seeds which are very weak and are not able to grow under ordinary

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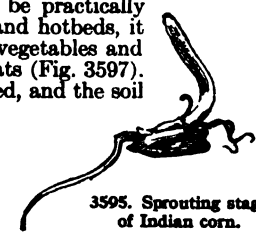
conditions and to push themselves through the soil. The sprouting test made in a specially prepared device, in which all conditions are regulated to a nicety, may be of the greatest value for purposes of scientific study and investigation and for the making of comparative tests between various samples, and the greater the sprouting test, the greater the germinating power; but one must not expect that the actual germination will always be as great as the percentage of sprouting. The test for sprouting shows only which seeds are alive. In many cases, the differences in results between the sprouting test in a specially prepared device and the germination tests in well-prepared soil in the open may be as great as 50 per cent. Viability varies with seasons and other conditions. While it is true as a general statement that the older the seed the less the viability, yet the reverse may be true within narrow limits. Sometimes lettuce and melons that germinate only 50 per cent in December, germinate 70 to 80 per cent in April. For a discussion of technical methods of seed-testing, see Vol. II, "Cyclopedia of American Agriculture," and other works.

3593. Sprouting stage.—Castor bean.

In order that seeds shall germinate, they must be supplied with moisture and be given a definite temperature. The requisite temperature and moisture vary with the different kinds of seeds, and these factors are to be determined only by experience. Seeds may be planted in any medium that supplies these requisite conditions. Although seeds are ordinarily planted in the ground, such practice is not necessary to germination. They may be planted in coconut fiber, moss, or other medium. However, the ground may supply the requisites for germination, and it also supplies plant-food for the young plantlet when it begins to shift for itself; and, furthermore, the plants are in the position in which it is desired they shall grow. In the case of many seeds, germination is more rapid and certain when the seeds are sown in coconut fiber or other medium, for the conditions may be more uniform. As soon as germination is fairly complete, the plants are transplanted to the soil.

The depth at which seeds shall be sown depends on many conditions. Out-of-doors they are planted deeper than in the house, in order to insure a uniform supply of moisture. A depth equal to twice the diameter of the seed is an old gardeners' rule. This applies well to the sowing of most seeds under glass when the soil is well prepared and is kept moist, but in the open ground three to four times this depth is usually necessary. The finer and moister the soil, the shallower the seeds may be planted, other things being equal. Better results in germination are secured when the seeds are sown in a specially prepared seed-bed. The conditions may then be better, the gardener is able to protect the young plants from cold and from insects and fungi, and he is enabled also to economize time and labor. In transplanting from the seed-bed to the field, the gardener unconsciously chooses only the best plants and thereby the crop is improved. The seed-bed may be in a forcing-house or hotbed, or in the open. If it is in the open, it should be near the buildings, where it can be visited frequently and where water may be applied as needed. If the bed is to be used late in the season when the soil is naturally dry, it is well to cover it the previous spring or fall with a coating of not too rich manure. This retains the moisture, and the leaching from the manure adds plant-food to the soil, thereby enabling the young plants to secure an early start. When the seeds are to be sown, the manure is removed and the surface is then in perfect condition. In the handling of young plants in seed-beds, one must take pains that the plants are not too thick and that they do not suffer for light, else they may become "drawn" and be practically worthless. In greenhouses and hotbeds, it is well to handle common vegetables and flower seeds in gardeners' flats (Fig. 3597). These flats are easily handled, and the soil is so shallow that it can be kept in uniform conditions of temperature and moisture. The seeds of some of the finer and rarer kinds of ornamental plants require special treatment. These treatments are usually specified in the articles devoted to those plants. Details of the handling of very delicate seeds are well discussed in the article on *Orchids;* see the article *Palm* and others, and the discussion of propagation of conifers, page 360, Vol. I.

3594. Germination complete.—Castor bean.



3595. Sprouting stage of Indian corn.

As a rule, seeds germinate best when they are fresh, that is, less than one year old. Some seeds, however, of which those of melons, pumpkins, and cucumbers are examples, retain their vitality unimpaired for a number of years, and gardeners do not ask for recent stock. Seeds of corn-salad should be a year old to germinate well. Very hard bony seeds, as of haws and viburnums, often do not germinate until the second year. In the meantime, however, they should be kept moist. Seeds of most fruit and forest trees should be kept moist and cool, otherwise they lose vitality; yet if kept too moist, and particularly too close or warm, they will spoil. Nuts and hard seeds of hardy plants usually profit by being buried in sand and allowed to freeze. The freezing and the moisture soften and split the integuments. Sometimes the seeds are placed between alternate layers of sand or sawdust: such practice is known technically as stratification.

L. H. B.

Seed-breeding and -growing.

Seed-breeding may be considered from at least two very distinct viewpoints: first, the origination and development of new and improved varieties, either through selection or cross-breeding; and second, the development and raising of truer purer stocks of strains of proved value. See *Breeding of Plants*, Vol. I.

The first, as a rule, seems the most attractive inversely to one's knowledge and experience, but the growing of better and purer strains of the sorts which have proved best suited to one's local conditions and individual requirements is of far greater practical value. An important consideration of success in raising new varieties is the widest obtainable knowledge not only of the varietal forms of the species generally grown, but of the many stocks which at different times and in different locations have been found to be of so little practical value that they have never come into general cultivation. A second requisite is familiarity with the growing habits of the plant, and those of similar species, and the dexterity which can come only through practice in the crossing of the flowers and securing good growth and development of the fruits. There should also be developed a capacity for a quick judgment as to the probable correlation between conspicuous variations with others less discernible by the eye but which may effect the cultural value. Lastly, the development of new varieties of real value can come only through the practice of almost infinite patience which makes one content to throw into the dump thousands upon thousands of plants, many of which had seemed most promising, and to be satisfied if after years of labor one

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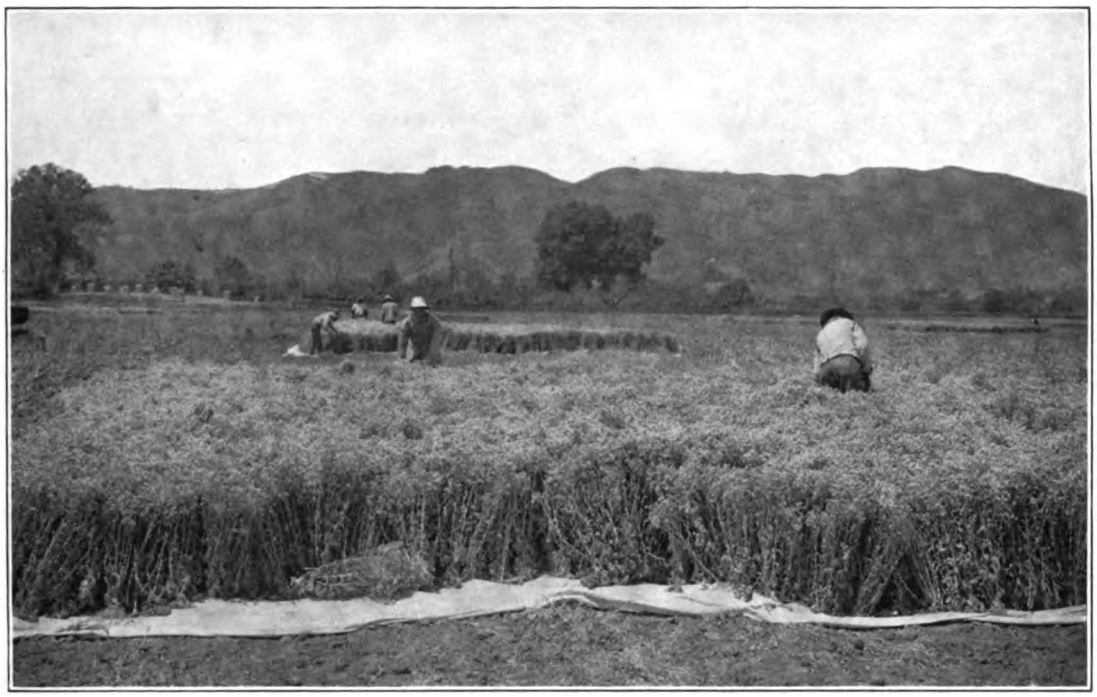

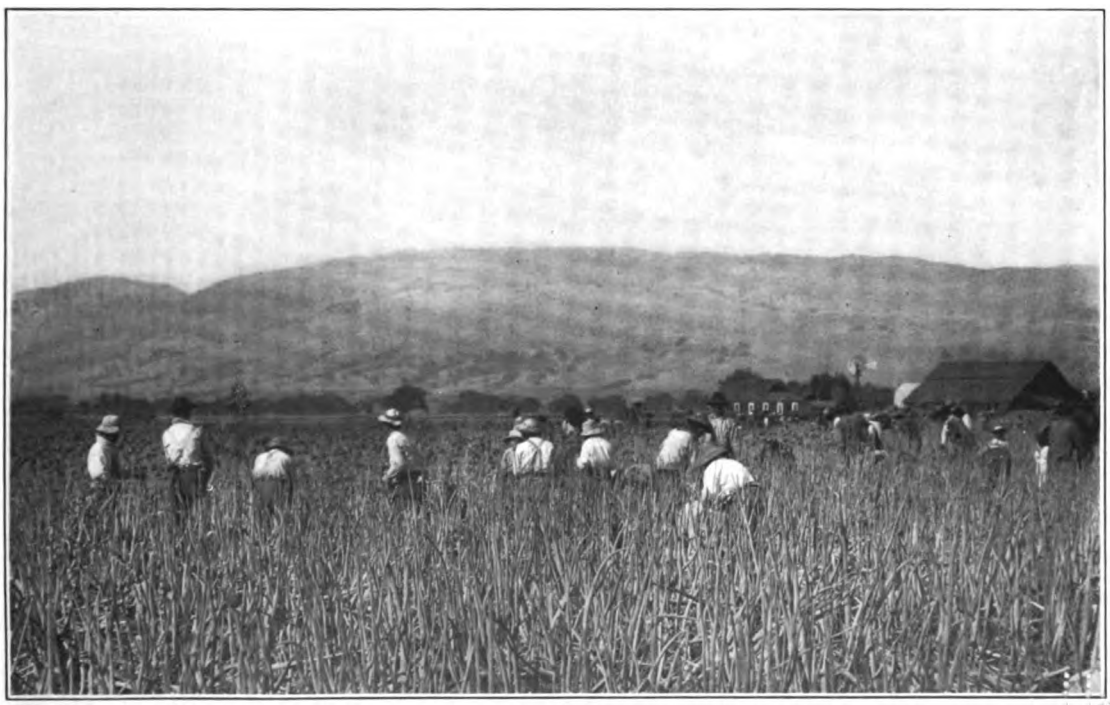

CIV. Seed-growing in California.—Above, drying and turning lettuce stalks on the sheets. Below, cutting onion heads.

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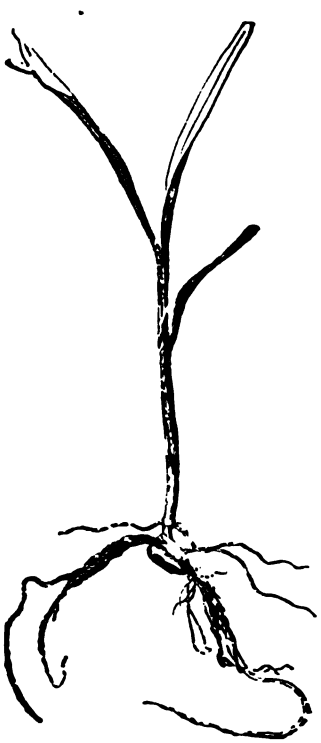
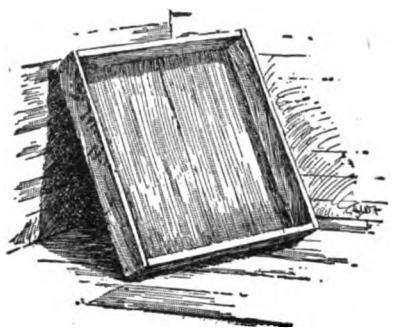
secures but a single variety or marked form of real value to the cultivator.

The second, and perhaps the most important branch of seed-breeding, is the raising of purer strains of stocks of proved value. An illustration of the need of work in this direction can be drawn from a recent trial planting of garden beets in which it was found that practically every root grown from 2-rod plantings of each of 214 samples of seed purchased under distinct varietal names from the most reputable seedsmen of America and Europe could be grouped into not over twenty distinct forms, and the roots so thrown together show as little variation as the crop from any one of the twenty most uniform samples in the trial. Often the only difference between two lots sold under different names would be in the proportion of the roots of each lot that conformed to the same varietal form. It is thought that seed-stocks of most species of garden vegetables would show similar variation, though possibly not to the same degree, and this is not so generally due to carelessness in growing or handling as to the want of adherence on the part of the seed-grower to clear-cut ideals of varietal form. Every plant grown from seed has a certain definite and changeless character which was inherent in the seed from which it was grown and is made up of a balanced sum of different tendencies, potentialities, and limitation of development inherited in different and varying degrees from each of its ancestors for an indefinite number of generations, plus more or less influence from climatic and other conditions effecting the development of the seed-producing plant. Generally the influence of the immediate parent is the dominant one, but not infrequently a characteristic of an ancestor which has been transmitted unexpressed for many generations appears in such strength as to change the whole character of the plant.

Under these conditions, a necessary preparation for the growing of better stocks is the formation of a very clear and comprehensive conception of the exact varietal character of the stock to be grown, and a rigid adherence to that ideal in the selection of seeding plants from year to year, never giving way to the ever-present temptation to use some superlative individual which differs in any respect from the original ideal of the stock. A most important aid, if not a requisite, for such persistence is the writing out and placing on file for frequent reference the fullest practical description of the exact varietal character of the sort. With this in hand, a few plants which come as near as possible to that ideal are selected, and the seed of each saved separately. The next season samples of each of these lots are planted in a preliminary trial. As they develop, and with the written description of the desired form in hand, they are carefully compared and the lots which most uniformly adhere to the described form are selected. The next season the reserved seed of the lots which seemed the best in the preliminary trial are planted in blocks as far as possible from each other, or any plants of the species, and the seed raised used for larger plantation for use as stock seed, in the meantime starting another selection from individual plants to take the place of the first, as it deteriorates. An illustration will show the value of careful selection and the necessity for constant renewal of even the purest of stocks. A very carefully bred strain of a variety of watermelon was used to plant a 20-acre field grown for seed. When about three-fourths of the fruit was ripe, several hours were spent in looking over the field for "off" stock and less than fifty fruits were found which should be removed. Fully 75 per cent of the fruits were so near alike that they could not be distinguished from each other. Seed from this field was used for planting seed crops and it was so good that little attention was paid to the stock; as a result, some years later, a crop grown in the same vicinity from seed of the same strain, but several generations removed, instead of less than fifty "off" fruits on 20 acres, had fully 75 per cent of the fruits more or less distinctly "off" and less than 20 per cent were as uniformly ideal of the variety as were 99 per cent of those of the first crop.



3596. Germination complete in Indian corn.



3597. Gardener's flat, or a shallow box, in which seeds are sown and small plants handled. A good size for a flat is 16 x 20 inches, and 3 inches deep.

What might be termed commercial seed-growing has developed very rapidly in America in the past ten years, and there has not only been an increase in quantity, but an improvement in the varietal quality of the seed grown. Seed dealers having secured, sometimes at great cost, desirable stocks, enter into contracts with farmers located in sections where soil and climate are most favorable for the development of the best qualities of the sort and the securing of a full crop of the seed, to plant a given area and deliver to them the entire seed product. This the farmer does, often with little regard to selection, only taking the requisite pains to guard against contamination and mixture with other crops.

The United States Census of 1910 gives the total valuation of the vegetable- and flower-seed crop grown in the United States in 1909 at $1,411,013 (see page 3136), but it is thought that the amount actually produced was much larger, seed-dealers and -growers generally being inclined to depreciate the extent and profit of the business in order to lessen competition. Since then the amount grown and listed has increased materially, an estimate by a very experienced dealer of the area devoted to vegetable-seed crops in 1915 being as follows:

	Acres
Seed beans	50,000
Cabbage for seed	2,000
Sweet corn	15,000
Cucumbers	15,000
Onions	2,600
Muskmelons	6,000
Watermelons	6,000
Garden peas	50,000
Radish	4,000
Tomatoes	50,000

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This is the estimated area contracted for by growers especially for seed, but in the case of many crops, such as melons and peas, the amount of seed grown is greatly increased by crops which were originally planted with the intention of selling them as green vegetables, but which because of market conditions are allowed to ripen and are harvested and sold as seed.

WILL W. TRACY.

The seed trade of America.

The history of the seed business in colonial times is largely one of importation from Holland and England, when small hucksters carried a few boxes of popular seeds with an assortment of drygoods, foodstuffs, or hardware. Corn, barley, peas, onions, fruits, and vegetables, necessaries in fact for direct use, first claimed the attention of the colonists. Toward the end of the eighteenth century we begin to find references to the saving of stock seeds, and in the newspapers of the day are a number of advertisements of shopkeepers who dealt in seeds. Agricultural seeds were an article of commerce as early as 1747 (Pieters), clover, onions, beans, peas, carrots, cabbage and cauliflower, and others, being raised for seed in the colonies at that time, though chiefly imported. At that time Boston did most of the business. Among the earliest advertisers of seeds for sale were Nathaniel Bird, 1763, a book-dealer of Newport, R. I.; Gideon Welles, "on the Point," 1764; Samuel Deall, a dealer in general merchandise in New York in 1776; William Davidson of New York in 1768, while in Philadelphia, in 1772, we find one Pelatiah Webster advertising clover and duck-grass seed; James Loughead, "colly-flower" seed in 1775, while David Reid kept a general assortment.

It was not until the opening of the nineteenth century that America began to find that seeds could be grown here as profitably as they could be imported. Grant Thorburn, in New York, and David Landreth, of Philadelphia, seem to have been the largest dealers at that time. Thorburn's was perhaps the first business of importance devoted entirely to stock seeds, although this honor is disputed by the descendants of David Landreth. Thorburn, in his autobiography, says that he began his business by buying out the stock of one George Inglis for $15, Inglis agreeing to give up the market and to devote himself to the raising of seeds for Thorburn. This is but one of many small beginnings from which has grown a trade which now amounts to many millions; and this relation between seedsmen and growers is largely typical of relations which have obtained in the trade ever since.

With the development of the railway and the postal service the business grew rapidly, new land was found suitable for different varieties of seed, and a letter could carry to the countryman the garden seeds for his yearly consumption. There is probably no trade which has been more widely benefited by cheap postage and improved mail facilities, but of late years the distribution by Congressmen has tended to negative this benefit. The originally beneficent distribution of free seeds to pioneers and needy settlers was a form of agricultural encouragement against which there could be no criticism, but it has degenerated into an abuse, which is estimated to have taken a trade of some $4,000,000 during the past two or three decades out of the hands of the men who have built up the business.

Grant Thorburn's catalogue of 1822 was the first to be issued in pamphlet form, and it was the pioneer of the many finely and carefully illustrated catalogues with which we are familiar today. These catalogues have been largely instrumental in facilitating the specialization of the industry and its subdivision in the hands of the country dealer, who buys seeds at wholesale, combining as they do the most complete lists and illustrations of varieties with directions as to methods, conditions, and seasons for planting. They are distributed in hundreds of thousands. Up to 1844 the wording on the bags was written by hand, a laborious and expensive process, which of itself is an indication of the small volume of the trade at that date.

With regard to the export of seeds, A. J. Pieters' admirable report for 1899 in the Yearbook of the Department of Agriculture may be taken as the best information up to that date, and it indicates the development of the business in its earlier years. He says in part: "The statistics of exports date from 1855, and no separate records of imports of seeds were kept before 1873. Clover and grass seeds, especially timothy, have always taken the lead in the seed export trade, and until recent years garden seeds have not been a considerable factor in the total values. In 1825 some 10,000 bushels of clover seed were exported to England within a few months. How long this trade had existed we do not know. From 1855 to 1864 there is no record of any seeds exported except clover, but the value of exports increased from $13,570 in 1855 to $2,185,706 in 1863, the war apparently having no effect on the trade. The total value of the clover seed exported during this period aggregates $5,393,663. In the ten years ending with 1880, clover seed was not separately entered except in the last year, but the total exports of seeds amounted during that period to $20,739,277. The aggregate was increased by more than $3,000,000 before the end of 1890. From 1891 to 1898 there has been a slight reduction in the average annual value of seed exports and also in the amount of clover and timothy seed sent abroad." The value of "flower and vegetable seeds" reported in the Thirteenth Census (for 1909) is $1,411,013 as against $826,019 for 1899, an increase of above 70 per cent. Aside from this are grass seed to a value of $15,137,683 in 1909, not including beans, peas, and miscellaneous seeds. "Other grains and seeds" altogether (aside from "cereals") had a value in 1909 of $97,536,085. (See Tracy, page 3135).

The importation of staple garden seeds had largely decreased by 1870, and with the exception of a few staples in agricultural and flower seeds, America may be said to have become to a great extent self-supplying. The greatest development of this industry has taken place since the close of the war. In 1878 J. J. H. Gregory estimated that there were in all 7,000 acres devoted to garden seeds, while the census of 1890 showed that there were 596 seed-farms, containing 169,850 acres. Of these farms, 200 were established between 1880 and 1890, and it is likely that about 150 more were started during the same period. The census returns, however, do not give the actual acreage devoted to growing seeds. As many seeds are grown by those not regularly in the business, it is probable that census returns as to acreage are under rather than over the mark. The statistics available in the United States Census are very imperfect, partly owing to the lack of a continuous system in presentation, both in the returns of home industry and also in custom-house returns, but chiefly to the reluctance of seedsmen and growers to make public the results of their business methods or even the methods themselves.

The following table will give as close an estimate as can be made of the present annual cost of the chief staple garden seeds handled in America:

Garden peas	$1,500,000
Garden beans	400,000
Onion seed	500,000
Lettuce seed	250,000
Cabbage seed	200,000
Sweet corn	300,000
Tomato seed	150,000
Radish seed	125,000
Turnip seed	60,000
Beet seed	25,000
Celery seed	6,000
Miscellaneous seeds and flower seeds	250,000
Sweet peas, flowering	200,000
Probable invoice cost of imported garden seeds	2,000,000

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The seeds usually offered by seedsmen in their catalogues, or in the seed-stores throughout the country, are secured from various parts of the world, and the seedsman who sells seed at retail to the planter direct seldom grows his own seed, although some of the larger firms now conduct seed-farms on which they grow certain specialties, and most of them conduct trial and experimental grounds.

The wholesale seed business is divided into two distinct lines, one of so-called grass-seed dealers, who buy from the farmers such things as grass seeds, clover seeds, and farm seeds used for planting large areas; the other line is the general seed-dealer who carries a limited stock of grass seeds, clover seeds, and the like, and specializes on vegetable seeds and flower seeds. He is usually not a grower of seed, but buys from seed-growers who specialize on a few things.

A large part of the vegetable and flower seed used in America is imported from England, France, Germany, Holland, and Denmark, especially such things as beets and mangels, cabbage and cauliflower, turnip and rutabaga, and the small flower seeds. In Germany, the seed-growers usually own or lease their own seed-farms, while in other countries, especially France, much of the seed-growing is conducted on the subcontracting plan, the grower keeping an agent in a certain locality and letting out small contracts with the farmers. The finer vegetable seeds and flower seeds, as well as the larger lines, are grown in this way.

In America, the smaller vegetable seeds and sweet peas are grown principally in California, where the growers own or lease their seed-farms, and practically all of their capital is invested in the seed business. What are considered the "smaller vegetable seeds" and "California specialties" are carrot, endive, leek, lettuce, onion, parsnip, parsley, radish, salisfy, and flowering sweet peas. The preëminent California specialties are lettuce, onion, and sweet pea seed. There are no less than 5,000 acres, principally in the coast counties of central California, devoted to these three things. Pole beans, culinary peas, and some vine seeds are also produced in central California. These are grown on the subcontracting plan, much as in other places. Peas are now grown largely in Utah, Idaho, and Montana, as well as in Wisconsin, Michigan, and northern New York. Sweet corn and vine seeds are grown largely in Nebraska, northern Ohio, New York and New England. Watermelon seed is grown largely in the South; also okra. The best cabbage seed is produced in Long Island and to some extent in the country about Puget Sound in Washington. Pepper and eggplant, and some tomato seeds, are grown in New Jersey, and tomato seed is also grown in Michigan and California. Various other items are grown in greater or less quantities in various sections, such as beet and parsnip in New England, radish in Michigan, turnip in Pennsylvania, but the main sources of supply of these last-named articles are the European countries previously mentioned.

Seed-growers who subcontract their crops, usually ·erate large farms for the production of their stock ·eds, where they do their selecting and developing ·d where they grow the seeds which they send out to ·he farmer to produce crops for them. Such crops as are subcontracted are "rogued" and inspected throughout the season by the grower's agent. Seed-growing, as it affects vegetable and flower seeds, is conducted more or less scientifically and represents a very high state of intense farming, perhaps the highest known out-of-doors.

Seeds must be produced in regions where they can be grown not only profitably on account of climatic conditions and abundant labor, but also in sections where the quality can be maintained. Climates with a cold winter are usually required for biennial crops, such as carrot, beet, onion; when grown in California, the strains must be often renewed. Certain other crops require a dry summer climate, such as lettuce and sweet peas; other kinds require a moist or wet summer climate, as cabbage and cauliflower.

Many seed-growers now specialize on one or two lines, and there are large growers who raise nothing but tomato; others nothing but cabbage; others who raise only sweet corn; others field corn; and others confine themselves to watermelon. Owing to the frequency of crop failures in seed production, as in other farm crops, most seedsmen contract with at least two sources of supply and usually both widely separated.

Commission box assortments comprise one of the principal methods pursued in America for the sale of seed. This plan places with merchandise and grocery stores an assortment of staple seeds in flat papers and cartons. These assortments are usually sold on commission, but some firms sell the assortments outright. The boxes and unsold seed are collected every year and returned to the home firm, where the papers are torn, the seed tested and repapered with a proportion of new seed. Some twenty firms are engaged in this line of seed distribution, and one firm has nearly 150,000 customers to whom it consigns these assortments. Many of the merchants who take these commission boxes also carry small lots of staple seeds in bags to sell in bulk and are therefore seed merchants in a small way. They usually rely for their base of supply on the seed-houses who consign them the box.

Dealers in garden seeds are also large dealers in flowering bulbs, such as hyacinths, tulips, narcissi, crocus, and the like. These are chiefly imported from Holland, south of France, Italy, and Japan.

The trade is divided into the main branches of garden and flower seeds and bulbs, and agricultural seeds. The latter is practically a business by itself, devoted to such seeds as blue-grass, timothy, clover, red-top and alfalfa, some of which are exported or imported as the exigencies of the season's product demand.

Flower seeds are subjected to no import duties, while on garden seeds there is a tariff figured on a specific basis. It is a moot point whether this tariff at the present time operates to the advantage of the trade, the principal seedsmen being generally of the opinion that it tends to stimulate over-production in this country.

The main business of the country is in the hands of about 150 firms, but practically every groceryman in country towns and villages carries a stock during the spring season. These men, however, deal as a rule with the larger houses, and constitute the principal class of middlemen for retail trade.

The seed-growing and merchandizing industry is represented by the American Seed Trade Association.

J. M. Thorburn & Co.
C. C. Morse & Co.

SEEMÁNNIA (named for Berthold Seemann, 1825–1871). *Gesneriàceæ*. Strigose-pubescent perennial herbs with rhizomes, suitable for the warmhouse: sts. stout, simple: lvs. verticillate, in 3's or 4's, very short-petioled, frequently canescent below; the upper ones reduced to bracts: pedicels solitary in the axils: fls. red-purple; calyx-tube turbinate, adnate, lobes 5, narrow; corolla-tube bent downward, broadly and obliquely subcampanulate, the limb with very short erect-spreading lobes; disk annular, undulate and not divided; ovary almost entirely inferior: caps. nearly inferior.—Two species, S. Amer. *S. silvàtica*, Hanst. (*S. ternifòlia*, Regel). Plant 3–4 ft. high: lvs. 3–4 in a whorl, very shortly petioled: fls. solitary, bright scarlet; calyx with 5 narrow lobes; corolla short-gibbous at base. Winter. Peru. Gt. 4, p. 182.

SELAGINÉLLA (diminutive of Latin *Selago*, old name of a club moss). *Selaginellàceæ*. Club Moss. A large group of mostly tropical plants with small scale-like leaves and of diverse habit, ranging from minute prostrate annuals to erect or even climbing perennials.

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Easily recognized by the production of two kinds of spores—powdery microspores from which the male prothallus arises and larger microspores produced 4 in a sporangium just within the axil of the terminal lvs. of the st. which often form a 4-angled spike. In all our cult. species the lvs. are in 4 ranks, the 2 upper smaller and pressed against the st., giving it a flattened appearance. Selaginellas are graceful fern-like greenhouse plants, often known to gardeners as lycopodiums. The botany of the genus is in an uncertain state, both as to nomenclature, and the limits of species. They are plants of the Pteridophyta or fern allies.

Selaginellas are favorite plants in every good conservatory, being greatly admired for their feathery moss-like foliage. They have various shades of green, and some of them are remarkable for metallic and iridescent tints, especially bronze and bluish colors, the latter being very unusual among plants in general. *S. Willdenovii* is a very choice large-growing species of the bronze and blue class. Another is *S. uncinata*, often called "rainbow moss." Selaginellas are often grown for their own sake as specimen plants, but they are also very commonly used as edging for greenhouse beds, for covering unsightly spots under the benches, and for hiding the surface soil of large tubs, orchid pots, and the like. (See Fig. 3598.) They are also delightful subjects for table decoration when grown in pans or jardinières. For this purpose a well-grown selaginella should be a dense compact mass of fluffy and feathery green, not a weak thin straggling plant, as compared in Figs. 3599 and 3600. Selaginellas are also employed in bouquets of flowers, fronds being used for "green" instead of asparagus or fern. Occasionally a fancier of the more difficult species grows a large specimen in a Wardian case for exhibition. In general, selaginellas are of easy culture. As a rule they prefer shade and moisture and are somewhat tender in foliage compared with some of the commonest of commercial ferns. *S. denticulata*, *S. Kraussiana*, *S. Martensii*, and some other

3598. A selaginella used to cover the soil of an orchid pot.—S. denticulata. (×¼)

commercial favorites may be rapidly propagated without any preliminary treatment in the cutting-bench. Cuttings of these species about an inch and a half long may be inserted directly into small pots of light sandy soil, placed in a shady position. Syringe them lightly three or four times a day for a week, at the end of which time they will take root. They will soon grow into salable plants. The popular *S. Emmeliana*, which is generally considered by florists a variety of *S. cuspidata*, requires different treatment. It is much slower and sometimes requires about nine months from the making of cuttings until the young plants are ready for potting. Fill regular fern-boxes with fern soil, adding one part in five of sand, and press firmly. Choose mature fronds of the *S. Emmeliana*, cut them into pieces half an inch long, scatter thinly over surface of soil, and put just enough finely screened soil on top of the cuttings to attach some small portion of them to the soil. Water thoroughly, cover with glass, and place in a temperature of 70° F. In this condition they will soon form roots and little plants at almost every joint. When sufficiently large they should be separated and transplanted singly an inch apart into boxes, where they may be left until large enough to be potted. The following list of selaginellas for special and general purposes is not designed to be complete, but merely suggestive. For commercial purposes, *S. denticulata*, *S. Kraussiana*, *S. Martensii*, and *S. Emmeliana;* for carpeting the soil, *S. denticulata;* for table decoration, *S. Emmeliana* and *S. Martensii;* for cutting, the commercial kinds; for veranda-boxes, *S. Braunii;* for bronze and blue colors, *S. Willdenovii* and *S. uncinata;* for specimen plants and exhibitions, *S. Braunii*, *S. Lyallii*, *S. viticulosa*, *S. Wallichii*, and *S. Willdenovii*. Also the following, which are generally considered more difficult subjects: *S. atroviridis*, *S. hæmatodes*, and *S. molliceps;* for curiosity, *S. serpens* and *S. lepidophylla*. The curiosities of the genus call for special mention. *S. serpens* is remarkable for its changes of color during the day. In the morning the foliage is bright green; during the day it gradually becomes paler as though bleached by the light; toward night it resumes its lively green hue again. For *S. lepidophylla*, see *Resurrection Plants*. The following species also deserve a few running notes: *S. Braunii* is an old favorite which is often incorrectly labelled *S. Willdenovii* in collections. Its branches, or "foliage" in the popular sense, are exceptionally tough and wiry for the genus. Variegated forms appear in *S. Martensii*, *S. Kraussiana*, and *S. involvens*, the last-named species being prolific in singular forms. *S. viticulosa* is better adapted for use as a pot-plant than for mingling in a fernery, because of its strong-growing erect fern-like habit. The branchlets are thrown up from creeping stems and do not root readily, so that this species is usually propagated by division or spores. (W. H. Taplin and N. N. Bruckner.)

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KEY TO THE SPECIES.

A. *Lvs. all similar, many-ranked: native species* ..... 1. **rupestris**

AA. *Lvs. 4-ranked, of two sorts, forming an upper and a lower plane: mostly hothouse exotics.*

B. *Foliage of the spikes uniform.*

C. *Main st. decumbent, usually rooting throughout.*

D. *Plants perennial: lvs. firm.*

E. *Sts. continuous, i. e., without joints.*

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F. *Branches ⅛ in. or less wide: sts. 6–9 in. long* ..... 2. **denticulata**
3. **serpens**
4. **patula**

FF. *Branches ¼ in. or more wide: sts. 1–2 ft. long* ... 5. **uncinata**
6. **plumosa**
7. **concinna**

EE. *Sts. articulated* ..... 8. **stolonifera**
9. **Kraussiana**

DD. *Plants annual; lvs. and st. weak and flaccid* ..... 10. **Cunninghamii**
11. **brasiliensis**
12. **apus**
13. **albo-nitens**

CC. *Main sts. ascending, branched nearly or quite to the base.*
D. *Roots confined to the lower half of the sts.*
E. *Plants perennial, with continuous sts.*
F. *Color of lvs. and st. pale or bright green* ..... 14. **atroviridis**
15. **californica**
16. **Martensii**

FF. *Color of lvs. dark green, becoming red: st. reddish brown* ..... 17. **rubella**

EE. *Plants annual* ..... 18. **Poulteri**

DD. *Roots confined to the base of the sts.*
E. *Sts. crowded in rosettes, curling closely when dry* ..... 19. **involvens**
20. **lepidophylla**
21. **cuspidata**

EE. *Sts. 6–12 in. high, not curling in rosettes* ..... 22. **Emmeliana**

EEE. *Sts. elongated (2 ft. or more), not crowded.*
F. *Lvs. equal-sided at base* .... 23. **Wallichii**
24. **Victoriæ**

FF. *Lvs. produced on upper side at base* ..... 25. **gracilis**
26. **Lobbii**

CCC. *Main sts. climbing* ..... 27. **Willdenovii**

CCCC. *Main sts. erect, the branches confined to the upper portion, naked below.*
D. *Sts. not jointed.*
E. *Color of sts. straw-colored, or at most only pink-tinted.*
F. *Lvs. long, the ultimate divisions of st. ½–¾ in. wide* .. 28. **grandis**

FF. *Lvs. shorter or minute; the ultimate divisions of st. 1/16–⅛ in. wide.*
G. *Plants usually less than a foot high* ..... 29. **viticulosa**

GG. *Plants 1–2 ft. high* ..... 30. **caulescens**
31. **Braunii**
32. **flabellata**
33. **Vogelii**
34. **Lyallii**

EE. *Color of sts. crimson* ..... 35. **erythropus**
36. **hæmatodes**

DD. *Sts. jointed in lower two-thirds* ..... 37. **geniculata**

BB. *Foliage of spike of two kinds, the smaller forming a lower plane, the larger an upper* ..... 38. **cordifolia**
39. **molliceps**

1. **rupéstris,** Spring. A small, rock-loving perennial, with branching sts. 4–5 in. long, many-ranked lvs. ending in a white awn, and square, 4-angled spikes. Native of the eastern half of the U. S., but replaced by many allied species in the Rocky Mts. and on the Pacific coast. The writer has separated 6 of these and Dr. Hieronymus, at Berlin, has also characterized 10 others.

2. **denticulàta,** Link. Fig. 3598. Sts. less than 6 in. long, matted: lvs. of the lower plane slightly spaced, denticulate, cordate on the upper side at base and imbricated over the st.; lvs. of upper plane cuspidate. Medit. region throughout.—Trade names are vars. **aûrea** and **fôliis variegàtis.**

3. **sérpens,** Spring. Sts. 6–9 in. long, trailing, bright green, copiously branched: lvs. of lower plane crowded, obtuse, spreading, ciliated at the rounded base; lvs. of upper plane obliquely oblong, acute. W. Indies.—Long in cult.

4. **pátula,** Spring (*S. sarmentòsa,* A. Br.). Sts. slender, trailing, pale green, 6–9 in. long, with long, tail-like tip, and fewer short pinnate branches: lvs. of lower plane crowded, erect-spreading, oblong-lanceolate, somewhat acute; lvs. of upper plane one-third as long, acute. Jamaica.

5. **uncinàta,** Spring (*Lycopòdium cæsium* and *Selaginélla cæsia,* Hort.). Sts. 1–2 ft. long, extending in a somewhat naked tip beyond the branches, doubly grooved above, with short, alternate branches: lvs. thin, blue-green, with a distinct midrib, slightly more produced on the upper side; lvs. of upper plane cuspidate, much imbricated. China.—In 1893 John Saul offered "*S. cæsia arborea*" with the remark that *S. lævigata* was a synonym thereof.

6. **plumòsa,** Baker. Sts. 6–12 in. long, flat above, often forked near the base: lvs. of lower plane close, bright green, much more produced on upper side of midrib, ciliated on both sides at base; lvs. of upper plane half as long, ovate, much imbricated. India, Ceylon, China, Malay Isls.

7. **concínna,** Spring (*S. serrulàta,* Spring). Sts. 1 ft. or more long, copiously pinnately branched, with more or less fan-shaped compound branches: lvs. of lower plane crowded, bright green, glossy, much dilated and rigidly ciliate on the upper side at base; lvs. of upper plane one-third as long, long-cuspidate, much imbricated. Mascarene Isls.—Var. **fôliis variegàtis,** Hort., is cult.

8. **stolonífera,** Spring. Sts. a foot or more long, with a more or less naked tip, angled above and below, with short, compound branches: lvs. of lower plane closely set, rigid, acute, short-ciliate and minutely auricled at base. W. Indies.

9. **Kraussiàna,** A. Br. Sts. 6–12 in. long, flat on the back, rounded on the face, copiously pinnate, with compound branches: lvs. of upper plane spaced on the branches and main st. acute, slightly imbricated over the st.; lvs. of upper plane obliquely ovate, acute. Afr., Madeira.—*S. Brównii,* Hort., is a dwarf form from the Azores. Vars. **aûrea** and **variegàta** are American trade names.

10. **Cúnninghamii,** Baker. Sts. copiously pinnate, the lower branches compound: lvs. of lower plane ovate or oblong, cordate and very unequal-sided at base, much imbricated over the st.; lvs. of upper plane distinctly cuspidate. Brazil.

11. **brasiliénsis,** A. Br. Sts. copiously pinnate, the lower slightly compound: lvs. of lower plane mostly spaced, acute, cordate at base, ciliate and imbricated over the st.; lvs. of upper plane half as long, cuspidate. Brazil.—Similar to preceding, but with longer lvs.

12. **àpus,** Spring. Sts. 1–4 in. long, angled above, with short, simple or forked branches: lvs. of lower plane pale green, serrulate but not ciliate, cordate on the upper side; lvs. of the upper plane ovate. Canada to Texas.—*Lycopodium densum,* cult. at the Harvard Botanic Garden, is said to belong here.

13. **álbo-nítens,** Spring. Sts. slender, trailing, the lower branches slightly compound: lvs. of lower plane spaced on main st., short-ciliate, bright green; lvs. of upper plane one-third as long, cuspidate. W. Indies.

14. **atrovíridis,** Spring. Sts. 6–12 in. long, ascending, doubly grooved above: lvs. of lower plane spuriously 3-nerved, firm, broadly rounded; lvs. of the upper plane half as long, long-cuspidate, much imbricated. India.

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15. **califórnica,** Spring. Sts. 4–6 in. long, 4-angled, copiously pinnate: lvs. of lower plane ovate, minutely cuspidate, denticulate on the upper side at the base; lvs. of the upper plane very small, ovate-oblong. Said to come from Low. Calif. but not known at Kew and doubtfully in cult. in this country.

16. **Mártensii,** Spring. Fig. 3599. Sts. 6–12 in. long, flat or rounded below, angled above: lvs. of lower plane oblong-lanceolate, serrulate but not ciliate, slightly imbricated over the st. at base; lvs. of upper plane obliquely oblong, long-cuspidate. Mex.—Exists under many varieties in cult.

17. **rubélla,** Moore. Sts. 1 ft. long, somewhat erect in habit, reddish brown, with 2 grooves on the upper face: lvs. of lower plane dark green, becoming reddish with age, obtuse or obscurely cuspidate, ciliated and imbricated over the st. at the upper side of base; lvs. of upper plane ovate-cuspidate. Native country not known.—Has been in cult. since 1870. Var. **variegàta,** Hort., is cult.

18. **Pòulteri,** Hort. Veitch. Sts. densely tufted, slender, suberect, 2–3 in. long, 3–4 times dichotomously forked: lvs. of lower plane spaced, suborbicular, obtuse, bright green; lvs. of upper plane nearly as long, but ovate and acute. Azores.

19. **invólvens,** Spring. Sts. densely tufted, 2–6 in. long, deltoid, branched nearly to the base: lvs. of lower plane crowded, ovate, with a distinct cusp, bright green, thick, rigid, serrulate on both margins; lvs. of upper plane nearly as long, ovate-lanceolate, cuspidate. Japan to India and the Philippines.

20. **lepidophýlla,** Spring. RESURRECTION PLANT. Sts. 2–4 in. long, densely tufted, spreading in a close spiral so as to form a flattish expanse, curling closely into a ball when quite dry: lvs. of lower plane oblique, obtuse, minutely ciliated, green on the face, paler below; lvs. of upper plane nearly as long, obliquely ovate, obtuse. Texas and Mex. to Peru.—Often sold dry under the name of "resurrection plant" (which see), as the absorption of water will cause the ball with a dull brown exterior to expand and show its bright green upper face of the sts. long after the plant is dead.

21. **cuspidàta,** Link. Sts. densely tufted, 6 in. or more long, branched nearly to the base, with copiously compound branches: lvs. of lower plane obliquely ovate, cuspidate, dilated and ciliated on the upper side at the base, pale green edged with white; lvs. of upper plane

3599. Poorly grown specimen of club moss, unsuitable for table decoration.—Selaginella Martensii. (×¼)

nearly as long, obliquely ovate, cuspidate. Cuba and Mex. to Venezuela.—A plant occurring under the horticultural name *Lycopodium cordifolium* has the st. a foot or more long and simple in its lower part, and doubtless represents a distinct species.

22. **Emmeliàna,** Hort. Fig. 3600. Sts. 6–12 in. high, the primary branches ascending, bipinnate: lvs. of lower plane close, obliquely ovate, those of the branchlets narrower and minutely spinulose; lvs. of upper plane raised above those of the lower one-half as large, spinulose-serrulate, short-cuspidate. S. Amer.(?).—Named for Th. Emmel, a German gardener. Var. **aùrea** is a yellow form. This species and its variety are most commonly seen in the American trade. They require a constant supply of moisture. If allowed to dry, the tips of the fronds turn brown and do not recover.

23. **Wállichii,** Spring. Sts. 2–3 ft. long, with lanceolate branches and simple crowded branchlets: lvs. of lower plane crowded, smaller toward the end of the pinnules; lvs. of upper plane one-fourth as long, cuspidate: spikes ½–1 in. long. India and the E. Indies.—Highly ornamental.

24. **Victòriæ,** Moore. Sts. 3–4 ft. long, with lanceolate-deltoid, caudate branches, with the lower branchlets forked or slightly pinnate: lvs. of lower plane crowded, a line long, truncate at base and obscurely petioled; lvs. of lower plane one-fourth as long, short-cuspidate: spikes 1–2 in. long. Borneo and Fiji Isls.

25. **grácilis,** Moore. Sts. 2–3 ft. long, somewhat roughened, with lanceolate branches and simple branchlets: lvs. of lower plane ovate-falcate, adnate to st. on lower side at base; lvs. of upper plane ovate-lanceolate, cuspidate. Polynesia.

26. **Lóbbii,** Moore (*S. cognàta,* Hort.). Sts. 3–4 ft. long, with lanceolate-deltoid branches and contiguous simple or forked branchlets: lvs. of lower plane oblong-lanceolate, acute, bright green, truncate at base; lvs. of upper plane one-third as long, obliquely ovate, cuspidate. Borneo and Sumatra.

27. **Willdenovii,** Baker. Sts. reaching a length of many feet, with spreading deltoid branches and much compound branchlets, the ultimate short and contiguous: lvs. of lower plane crowded, ovate or oblong, tinted with blue, obscurely petioled; lvs. of upper plane one-third as long, obliquely oblong, not cuspidate. India and the E. Indies.

28. **grándis,** Moore. Sts. 1½–2 ft. long, branched above: lvs. of lower plane crowded, lanceolate, acute, rather firm; lvs. of upper plane one-third as long, ascending, much imbricated. Borneo.

29. **viticulòsa,** Klotzsch. Sts. with deltoid 2–3-pinnate branches: lvs. of lower plane ascending, acute, short-ciliated and much imbricated over the st.; lvs. of upper plane one-third as long, obliquely ovate, cuspidate. Cent. Amer.

30. **cauléscens,** Spring (*S. amæna,* Hort.). Sts. stiff, erect, the short final branchlets curling when dry: lvs. of lower plane crowded, ovate, falcate, bright green; lvs. of upper plane one-third to one-fourth as long, cuspidate. Japan, China, and E. Indies. Var. **argéntea,** Hort., is advertised.

31. **Braùnii,** Baker. Sts. deltoid and flexuous above, with deltoid erect-spreading pinnæ, the pinnules short, deltoid and spaced: lvs. of lower plane ovate-rhomboid, usually revolute at both edges; lvs. of lower plane short-cuspidate. W. China.

32. **flabellàta,** Spring. Sts. erect, deltoid, decompound, with contiguous final branchlets: lvs. of lower plane obliquely ovate, acute, broadly rounded and ciliated at the base; lvs. of upper plane obliquely ovate, cuspidate. Widely distributed in tropical regions.—One of the forms of this is cult. as *S. crispa,* Hort.

33. **Vògellii,** Spring (*S. africàna,* A. Br. *S. Pervillei,* Spring). Sts. decompound above, the lower pinnæ deltoid, petioled, 3–4-pinnate: lvs. of lower plane lanceolate, ascending, often revolute on both edges, truncate at base; lvs. of upper plane minute, strongly cuspidate. Afr.

34. **Lỳallii,** Spring. Sts. deltoid above, the lower pinnæ bipinnate, the final divisions ½–1 in. long, ⅛–⅙

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in. wide: lvs. of lower plane oblong-lanceolate, falcate, acute; lvs. of upper plane minute, acute. Madagascar.

35. **erythropus,** Spring. Sts. under a foot long, deltoid and decompound above, the lower pinnæ 3-pinnate, the ultimate divisions ⅛–⅙in. wide: lvs. of lower plane oblong-lanceolate, acute, strongly ciliated; lvs. of upper plane one-half as long, cuspidate. Trop. Amer.—*S. selòsa,* Hort., is said to be a starved form.

36. **hæmatòdes,** Spring (*S. filicìna,* Spring). Sts. 1–2 ft. long, the deltoid pinnæ 3–4-pinnate, the ultimate

3600. Well-grown specimen of Selaginella Emmeliana. Suitable for table decoration. (×¼)

divisions ⅛–⅙in. wide: lvs. of lower plane ascending, oblong-rhomboid, acute, dilated on upper side at base, not ciliated; lvs. of upper plane minute, cuspidate. Venezuela to Peru.

37. **geniculàta,** Spring (*S. elongàta,* Kl.). Sts. 2–3 ft. long, decompound, with lower pinnæ 3-pinnate, the divisions ascending and pinnately arranged: lvs. of lower plane ovate, acute; lvs. of upper plane one-third as long, ovate-lanceolate. Costa Rica to Peru.

38. **cordifòlia,** Spring (*S. cordàta,* Kl.). Sts. trailing, a foot long, with short branches often ending in whip-like tips: lvs. of lower plane acute, pale green, ciliated on the upper edge, dilated and subcordate; lvs. of upper plane ovate-lanceolate, cuspidate. W. Indies.

39. **mólliceps,** Spring (*S. rubricaùlis,* A. Br.). Sts. erect, 6–9 in. long, bisulcate above, much compound: lvs. of lower plane oblong-lanceolate, dark green, very unequal-sided, serrulate on the upper edge; lvs. of upper plane one-half to one-third as long, ovate or ovate-lanceolate, cuspidate. Afr.

The following American trade names can not be satisfactorily accounted for as species: *S. acaùlis* is said to be one of the most important commercial species cult. in Amer.—*S. circinàta* is cult. at Harvard Botanic Garden.—*S. Lageriàna* was intro. from Colombia and probably belongs to species already described from that country. It is said to be a very light green plant and a strong grower, whereas S. Pitcheriana is of dwarfer habit and with sts. and under surface of fronds red and upper surface dark green.—*S. Mandiàna* is a recent intro. by W. A. Manda which can not be satisfactorily placed.—*S. paradóxa.* Offered by John Saul, 1893.—*S. Pitcheriàna.* Consult S. Lageriana. Colombia.—*S. rubicúnda* and *S. triangulàris* were offered by Saul in 1893.—*S. umbròsa.* Once cult. by Pitcher & Manda, of the United States Nurseries.

L. M. Underwood.
R. C. Benedict.†

SELÈNIA (probably from the Greek *moon;* said to refer to the round seeds). *Cruciferæ.* Small annual herbs sparingly grown in gardens: lvs. pinnatisect: racemes terminal, leafy: fls. yellow; sepals spreading, colored, subequal; petals erect: silique stipitate, oval berry much compressed or turgid, acute at the base, valves reticulate.—Three species, N. Amer.

aùrea, Nutt., is a hardy annual of the mustard family, a native of the U. S. from Ark. and Texas to the base of the Rockies. It is not known to be cult. in Amer., but it seems to be one of the prettiest of our few native ornamental crucifers. It has small yellow fls. about ½in. across, each of the 4 petals having a central band of red. It is also interesting for its finely cut foliage and its flat pods through which the seeds may be vaguely seen, as in the case of lunaria, or "honesty." It grows about 9 in. high. B.M. 6607.

F. Tracy Hubbard.†

SELENICÈREUS (*moon goddess* and *cereus*). *Cactàceæ.* Cacti with slender trailing hanging or climbing sts., more or less epiphytic: ribs several, usually low, with closely set areoles bearing small short or acicular spines: fls. large, nocturnal, fragrant; ovary and fr. covered with clusters of small spines often accompanied by long hairs.—More than 20 species are known. This genus contains a number of easily grown species which are great favorities in cult. on account of the great size and beauty of the fls. Some of the species are reported to possess medicinal properties. These plants have been referred to *Cereus.*

A. *Fl.-tube and ovary without long hairs.*

B. *Spines on sts. acicular.*

vàgans, Brit. & Rose (*Cèreus vàgans,* Brandeg.). Sts. slender, numerous, clambering over rocks in the wild state, but in cult. ascending: ribs low: spines rather short, yellowish: fls. 6 in. long; tube, including throat, about 4 in. long, slightly curved, brownish, with small scattered bracts bearing in their axils clusters of 5–8 acicular spines; throat narrow, 2 in. long; sepals linear, the outer ones brownish, the inner ones greenish white, 2½ in. long; petals white, oblanceolate, 2½ in. long with a short acuminate tip, the margins, especially above, undulate or toothed; ovary covered with acicular spines. West coast of Mex.

BB. *Spines on sts. not acicular.*

spinulòsus, Brit. & Rose (*Cèreus spinulòsus,* DC.). Slender climbing vine, 10–14 ft. long: ribs usually 5, not very conspicuous in age: spines about 8, very short, usually dark: fls. 4½–5 in. long, white, with a pink tinge; ovary and fl.-tube bearing small clusters of acicular spines but no long hairs. Common in N. E. Mex. and S. E. Texas, but not found in the W. Indies. Blühenden Kakteen, pl. 53.

AA. *Fl.-tube and ovary bearing long hairs among the spines.*

B. *Spines of the sts. acicular.*

C. *Color of spines white.*

Donkelàri, Brit. & Rose (*Cèreus Donkelàri,* Salm-Dyck). A slender epiphytic plant, much branched, clinging to the bark of trees by aërial roots, commonly in company with orchids: branches long, slender, nearly terete, about ⅜in. diam. with 6–8 low, almost inconspicuous ribs; spines 10–15, very short, snow-white, closely appressed to the st. Brazil.

CC. *Color of spines brownish.*

grandiflòrus, Brit. & Rose (*Cèreus grandiflòrus,* Mill.). Creeping or clambering vines: sts. stout, often 1 in. diam., bluish green: ribs 7 or 8, low: spines acicular, yellowish brown or brownish: fls. very large, fragrant, 6–8 in. long. Jamaica, but said also to be native of Mex., which is doubtless wrong. B.M. 3381.—A number of species resembling *S. grandiflorus* in a general way, but specifically distinct, are often to be found under this name in collections; they need further study. This species is used in the manufacture of a heart-tonic.

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BB. *Spines of the sts. not acicular.*

C. *Sts. blue-green.*

pterânthus, Brit. & Rose (*Cèreus pteránthus*, Link & Otto. *Cèreus nycticàlus*, Link). Stout, suberect, or clambering vines: branches much elongated, bluish green, 4- or 6-angled: spines 1–4, short: fls. large, white, very fragrant, 7 in. long, the ovary covered with long white hairs intermixed with the short acicular spines. Mex. Lem. Cact. f. 11. Gesamtb. Kakteen f. 35.—One of the commonest and best night-blooming cacti.

CC. *Sts. deep green.*

D. *Knobs on ribs terete and low.*

MacDónaldiæ, Brit. & Rose (*Cèreus MacDónaldiæ*, Hook.). Clambering vines of rapid growth, freely branching: branches deep green: the ribs rather low, obtuse, somewhat interrupted: spines 1 or 2, short, porrect, dark: fls. very large, 14 in. long, white. Honduras, probably, but some recent writers claim it came originally from Argentina. B.M. 4707. Cact. Journ. 2:135.—One of the largest-flowered species of the cactus family and one of the best of the night-blooming kind.

DD. *Knobs on ribs flattened, rather high and reflexed.*

hamàtus, Brit. & Rose (*Cèreus hamàtus*, Scheidw. *C. rostràtus*, Lem.). Sts. often weak and sprawling or climbing and clambering, bright green, about 8 in. diam.: ribs usually 4, interrupted by flattened reflexed knobs bearing small areoles: spines 5 or 6, bristle-like, white; hairs more or less deciduous: fls. large, 10–12 in. long, white. Cent. Mex. Monatsschr. Kakteenk. 9:23. Gesamtb. Kakteen Nachtr. f. 7.—Numerous hybrids have been made by crossing some of these species, especially *S. grandiflorus*, *S. MacDonaldiæ*, and *S. hamatus*, with certain species of related genera. Some of these hybrids have been given distinct names in Cereus, such as *C. Màynardii*, *C. Regèlii* and *C. uràmos*.

Cèreus inérmis, Otto. Sts. slender, climbing, 4–5-angled, deep green: areoles small, naked except on juvenile shoots and then bearing several white bristles: fls. said to be large, probably nocturnal, but not often appearing on cult. plants. This is a rather insignificant plant. Intro. from Venezuela many years ago. This is not a true Cereus, and without seeing fls. or fr. its real status can not be definitely stated. Karl Schumann, however, associated it with this group, and if of this alliance, it should be placed near S. hamatus.

J. N. Rose.

SELENIPÈDIUM. For the species included in this genus in "Cyclopedia of American Horticulture," see *Phragmopedilum*. The true Selenipediums (or Selenipedilum) are few and seem not to be in cult.

SELENOCYPRIPÈDIUM (compounded from *Selenipedium* and *Cypripedium*). *Orchidàceæ*. A name proposed to designate hybrids between Selenipedium and Cypripedium. *S. Malhoùitri*=S. (Phragmopedilum) Schlimii × C. (Paphiopedilum) Harrisianum.

SELF-HEAL: *Brunella*.

SELF-STERILITY OF FRUITS: *Pollen and Pollination*.

SELÌNUM (Greek name for parsley). *Umbelliferæ*. Branched perennial herbs, glabrous, tall or rarely low, of little horticultural value: lvs. pinnately decompound: umbels compound, many-rayed; fls. white or rarely yellowish green; calyx-teeth obsolete or rarely noticeable; petals cuneate or broad, emarginate or 2-lobed: fr. ovoid or nearly quadrate.—About 35 species, mostly in the northern hemisphere but 1 from the mountains of Colombia and 1 from S. Afr.

tenuifòlium, Wall (*Oreócome Candòllei*, Edgew.). A hardy perennial with finely cut fern-like foliage and st. often 8 ft. high, branched, with numerous umbels of white fls.: ultimate segms. of lvs. narrowly lanceolate, acute: fr. 2–3 lines long, much compressed dorsally, 4–6 times as broad as thick; lateral ridges much the broadest. India. Gn. 38, p. 221.—Offered as a novelty in Amer. in 1899 and recommended as a foliage plant for single lawn specimens. F. Tracy Hubbard.†

SELLIÈRA (named for Natale Sellier, a French engraver who worked for Cavanilles). *Goodeniàceæ*. Two creeping and rooting perennial herbs of Austral. and New Zeal. and one of them extending to Chile: plant glabrous: lvs. entire, alternate or fascicled: fls. small, axillary, sessile or stalked; calyx 5-lobed; corolla oblique, split at the back, 5-lobed; stamens 5; ovary 2-celled or imperfectly so: fr. fleshy and indehiscent. The plants are probably not regularly in cult., but *S. radicans*, Cav., has been listed abroad as an aquatic: it grows in muddy or marshy and rocky places near the sea in New Zeal., Austral., and S. Amer.: sts. sometimes creeping several feet, forming matted and interlaced patches: lvs. very small to 4 in. long, nearly linear to obovate-spatulate, obtuse, entire, narrowed into long petiole: fls. 1 or 2 on the peduncle, ⅛in. long, white: fr. about ¼in. long, ovoid or obovoid. See Krause, in Engler's Pflanzenreich, hft. 54 (IV. 277 & 277a). 1912.

SELLIGUÈA (personal name, from Selligue, naturalist and mechanician). *Polypodiàceæ*. A group of ferns referred by Diels (Engler & Prantl, Die Natürlichen Pflanzenfamilien) to Polypodium. Only *P. Féei*, Mett. (*Selliguèa Féei*, Bory. *Gymnogràmma Féei*, Hook.), appears to be listed. It is described by Schneider as a small stove species of the Malay Isls., Java, and Borneo: fronds entire, from a creeping rhizome, the barren ones 3–4 in. long and 2 in. or less broad, the fertile ones narrower and longer-stalked.

SEMECÁRPUS (Greek, *mark* and *fruit*, referring to use of fruit-juice). *Anacardiàceæ*. Trees, sometimes grown in the warmhouse, or in the open far S.: lvs. alternate, simple, leathery: fls. small, polygamous, in terminal or lateral, branched, bracteate panicles; calyx 5-cleft, segms. imbricated and deciduous; petals 5, spreading, somewhat unequal; disk annular and rather broad; stamens 5; ovary superior, sessile, 1-celled: nut or drupe reniform.—About 35 species, Trop. Asia and Austral.

Anacárdium, Linn. f. Marking-Nut Tree. A moderate-sized deciduous tree with large, oblong or obovate-oblong lvs. 8–24 in. long by 5–10 in. wide: fls. greenish white, ¼in. across, nearly sessile, in stout branching panicles about the same length as the lvs.: drupe 1 in. long, smooth, black. India.—The black acid juice of the nut is used for printing cotton cloth. Cult. in S. Fla.

SÉMELE (named for the mother of Bacchus). *Liliàceæ*. Climbing Butcher's Broom. A warmhouse plant, hardy outdoors in the extreme S.: st. shrubby and branched, high-climbing over trees attaining a height of 50–60 ft., cladodia lf.-like, alternate or few, solitary at the axils of fuscous-membranaceous scales, ovate-lanceolate, acuminate, leathery: fls. small, yellow, fascicled, the fascicles on the margins of the cladodia; perianth persistent, tube very short, turbinate, almost hemispherical; crown none; ovary sessile in the perianth-tube, 3-celled: berry globose, pulpy, indehiscent.—One species, Canary Isls. What appear to be lvs. are technically "cladophylla," i. e., lf.-like branches. They are organs which have the form and function of lvs. but not the morphology. Semele belongs to the small group of 4 genera known as the Asparagus tribe, all the members of which have cladophylla. Semele differs from the butcher's broom (Ruscus) in having 6 anthers instead of 3 and in having the fls. borne on the margin of the cladophylla instead of along the midrib. Asparagus differs from both in having the fls. not borne on the cladophylla and the filaments free instead of grown into an urn-shaped body.

andrógyna, Kunth (*Rúscus andrógynus*, Linn.). Scandent, branching: cladodia ovate or ovate-lanceolate, acuminate, leathery: fls. small, yellow, clustered; ovary 3-loculed: berry globose, indehiscent. B.M. 1898 and 3029 (as *Ruscus androgynus*). R.H. 1894, p. 546.

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Gn. 72, p. 432. G.M. 31:477, 479; 37:261.—The members which have the position of lvs. are minute scales, in the axil of which are borne the cladophylla, the latter being 3–4 in. long. It is grown in the open in S. Calif. and is said to look like a gigantic smilax and to have dark green, tropical foliage likely to be mistaken for some of the Indian climbing palms.

F. Tracy Hubbard.†

SEMIBEGONIÉLLA is a recent genus of the Begoniaceæ, differing from Begonia in having a tubular male flower (Symbegonia has a tubular female flower), apparently not in cult. *S. Sodtroi*, C. DC., from Ecuador was described, and the genus founded, in 1908.

SEMPERVÌVUM (Latin, *living forever*). *Crassulàceæ*. Houseleek. Thick fleshy usually stemless, perennial herbs or subshrubs which are used for carpet-bedding, rockeries, and the like. See *Succulents* (p. 2672, Vol. V) for culture.

Leaves alternate, thick-fleshy, often revolute: cymes panicled, usually densely: fls. white, rose, green, yellow, or purple; calyx 6- to many-cleft or -parted, rarely 5-cleft; petals 6 to many, free or connate at the base, oblong or lanceolate; stamens double as many as the petals, rarely the same number, free; ovary with as many carpels as petals, free or the base or up to the middle immersed in the calyx-tube: fr. many-seeded follicles.—About 65 species, widely scattered in the mountains of the Old World. The genus was monographed (horticulturally) by J. G. Baker in Gardener's Chronicle for 1879, and his treatment has been followed here to some extent with the addition of several species and slight modifications to meet more recent knowledge of the genus. Sempervivum is closely related to Sedum, but the floral parts are multiples of 6 or some larger number, while the floral parts of Sedum are in 5's. The genus is a difficult one for the botanist, and the specific limits are very uncertain and unsatisfactory, no two authors agreeing. The key given will undoubtedly prove faulty, but is an attempt to simplify the determination of the species.

Sempervivums are mostly hardy perennials and stemless, and increase by rosettes (Fig. 3602) which are sent out from the parent plant, thereby suggesting the popular name "hen-and-chickens." The leaves are thick, short, and succulent. The flowers, which are borne in panicled cymes, are mostly yellow, greenish yellow, or some shade of rose or purple, rarely white. The individual flowers are larger than those of sedum, but the clusters are less showy. Houseleeks are cultivated more for foliage than for flowers. They are not used for as great a variety of purposes as sedums, but they are popular for carpet-bedding, rockwork, and covering dry banks and bare sandy wastes. They are of the easiest culture and are quickly multiplied by means of the offsets or rosettes. They may be used alone for permanent carpet-beds, and for this special purpose are preferable to the more popular but tender echeveria. The foliage remains green all winter. The leaves are often spotted with red toward the tip, and this color is brighter if the plants have full sunlight. The names "houseleek" and "hen-and-chickens" are loosely applied to the whole genus. If these names are to be restricted, the former should be used for *Sempervivum tectorum* and the latter for *S. soboliferum*. The common species, which grows on the roofs of houses in Europe, is *S. tectorum*. In the case of *S. soboliferum* the young rosettes are attached to the parent plant by a more slender thread than usual and more easily detach themselves and roll about. The spider-web species, of which *S. arachnoideum* is the commonest, are the prettiest of them all, by reason of the webs that cover the young rosettes. These coverings are made by the plants themselves and are incidental to development, but in some species are not strongly developed and in all the group are less noticeable in the old rosettes.

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KEY TO THE SPECIES.

A. *Plants without secondary rosettes on offshoots: fls. usually yellow.*
B. *St. herbaceous, with the basal lvs. in a rosette* ..... 1. **poculiforme**
BB. *St. shrubby, with the lvs. in a rosette at the end of the branches.*
C. *Surface of lvs. villous* ..... 2. **canariense**
CC. *Surface of lvs. glabrous.*
D. *Lvs. obovate-spatulate or roundish ovate.*
E. *Petals elliptical; calyx-segms. ovate* ..... 3. **arboreum**
EE. *Petals linear-lanceolate; calyx-segms. short-triangular* .... 4. **chrysanthum**
DD. *Lvs. oblong-spatulate.*
E. *Margin of lvs. ciliate* ..... 5. **tabulæforme**
EE. *Margin of lvs. papillose* .... 6. **spathulatum**
AA. *Plants with secondary rosettes on offsets or sessile.*
B. *Fls. usually 6-merous; not widespreading at maturity.*
C. *The fls. small; petals not fimbriated on the margin and keel.*
D. *Segms. of calyx linear-oblong; petals linear-oblong* ..... 7. **Heuffelii**
DD. *Segms. of calyx lanceolate; petals lingulate* ..... 8. **Reginæ-[Amaliæ**
CC. *The fls. large; petals fimbriated on the margin and keel.*
D. *New rosettes rolled up into round balls.*
E. *Lvs. obovate-cuneate* ..... 9. **soboliferum**
EE. *Lvs. oblanceolate* ..... 10. **arenarium**
DD. *New rosettes not rolled up into round balls* ..... 11. **hirtum**
BB. *Fls. usually 12-merous (9–14-merous); widely expanded at maturity.*
C. *Color of fls. yellow or yellowish.*
D. *Surface of lvs. glabrous.*
E. *The lvs. obovate-cuneate* .... 12. **Wulfenii**
EE. *The lvs ovate-lanceolate* .... 13. **albidum**
DD. *Surface of lvs. more or less hairy.*
E. *Blade of lf. ensiform, lingulate, or oblanceolate* ..... 14. **Pittonii**
EE. *Blade of lf. more or less obovate-cuneate.*
F. *Segms. of calyx oblong* .... 15. **rupicolum**
FF. *Segms. of calyx lanceolate.*
G. *Petals linear-lanceolate, acute, green-striate externally* ..... 16. **globiferum**
GG. *Petals lanceolate, acuminate, not green-striate externally* ..... 17. **grandiflorum**
CC. *Color of fls. reddish or purplish.*
D. *Inner lvs. of rosette with their tips connected by fine hairs like a spider's web. (The following 5 species are very closely related.)*

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SEMPERVIVUM

E. *Rosette lvs. glabrous or merely puberulent at apex.*
F. *Calyx-segms. lanceolate-linear, acute: cauline lvs. lanceolate-linear*.....18. **heterotrichum**
FF. *Calyx-segms. linear, obtuse: cauline lvs. oblanceolate to oblong*.....19. **Moggridgei**
EE. *Rosette lvs. more or less hairy.*
F. *Segms. of calyx linear*.....20. **arachnoideum**
FF. *Segms. of calyx ovate to lanceolate.*
G. *Cauline lvs. lanceolate; rosette lvs. oblanceolate.*21. **Doellianum**
GG. *Cauline and rosette lvs. lingulate*.....22. **Laggeri**
DD. *Inner lvs. of rosettes not connected by fine hairs like a spider's web.*
E. *Tips of lvs. with a tuft of hairs.*
F. *Lvs. ovate*.....23. **Hausmannii**
FF. *Lvs. oblanceolate.*
G. *Cusp of lf. distinct: fls. rose-red*.....24. **Pomelii**
GG. *Cusp of lf. obscure: fls. bright red*.....25. **fimbriatum**
EE. *Tips of lvs. without a tuft of hairs.*
F. *Surface of lvs. of the rosettes pubescent.*
G. *Stamens two-thirds as long as petals*.....26. **assimile**
GG. *Stamens half as long as petals.*
H. *Barren rosettes not more than 1 in. diam.*.....27. **pumilum**
HH. *Barren rosettes more than 1 in. diam.*
I. *Fls. numerous, mauve or red-brown*.....28. **montanum**
II. *Fls. few (4–8), bright red*.....29. **flagelliforme**
FF. *Surface of lvs. of the rosettes glabrous.*
G. *Rosette lvs. more or less ovate or obovate.*
H. *Lf.-blade broadest toward the base.*
I. *Color of lvs. dark green*.....30. **Schnittspahnii**
II. *Color of lvs. gray-green*.....31. **Mettenianum**
HH. *Lf.-blade broadest toward the apex.*
I. *Petals lanceolate*....32. **blandum**
II. *Petals linear.*
J. *Sepals linear-lanceolate*.....33. **Lamottei**
JJ. *Sepals lanceolate.*34. **tectorum**
GG. *Rosette lvs. oblanceolate-cuneate.*
H. *Red-brown tip of rosette lvs. none or obscure.*
I. *Young rosettes on peduncles 1 in. or more long*.....35. **Funckii**
II. *Young rosettes sessile or nearly so.*
J. *Lvs. glaucous*....36. **glaucum**
JJ. *Lvs. pale green but not glaucous.*
K. *Cauline lvs. green-tipped: petals rose*...37. **Verlotii**
KK. *Cauline lvs. claret-tipped: petals white-margined*....38. **atlanticum**
HH. *Red-brown tip of rosette lvs. distinct.*
I. *The cauline lvs. red-brown throughout.*39. **triste**
II. *The cauline lvs. partly green.*
J. *Rosette lvs. glaucous.*
K. *Outer lvs. of rosette ¾–1 x ½ in.: fls. about ½in. across*..40. **Greenii**
KK. *Outer lvs. of rosette 1–1¼ x ⅜in.: fls. about ¾in. across*.....41. **calcareum**
JJ. *Rosette lvs. not glaucous. (The following species are frequently kept distinct but no distinguishing key characters can be detected from the descriptions.)*
42. **arvernense**
43. **Boutigny-anum**
44. **alpinum**
45. **Boissieri**

1. **poculifórme,** Berger & DeWild. St. simple, erect, more or less elongated: basal lvs. in a rosette, oblong-lanceolate, cuneate at the apex, serrate-ciliate, otherwise glabrous; cauline lvs. obovate-spatulate: fls. 9-merous, in a glabrous panicle; calyx glabrous, segms. lanceolate-triangular subacute; petals lanceolate, acute. Canary Isls.(?).

2. **canariénse,** Linn. Subshrub: st. short, thick: lvs. in a flattened rosette, obovate-spatulate, mucronate, attenuate to a petiole, villous; cauline lvs. obovate-rotundate: fls. 7–9-merous, pale yellow or whitish, in a lax thyrsoid elongated panicle; calyx very villous, segms. ovate-lanceolate; petals linear, acute. Canary Isls.

3. **arbòreum,** Linn. St. arborescent, with terete branches: rosettes concave: lvs. spreading, obovate-spatulate, obtuse, mucronate, base cuneate, rather glabrous: fls. golden yellow in a many-fld. leafy panicle; calyx-segms. ovate, rather acute; petals spreading, 10–12, elliptical. Medit. region.

4. **chrysánthum,** Hochst. Subshrub, 1–2 ft. high: st. thick: lvs. pectinate-ciliate, on barren shoots rosulate, roundish ovate; cauline lvs. obovate-oblong, rounded above, apiculate: fls. about 8-merous, yellow, or white(?), in a thyrsoid corymb; calyx-segms. short-triangular; petals linear-lanceolate. Abyssinia.—Closely allied to *S. arboreum* and possibly not distinct from it.

5. **tabulæfórme,** Haw. Shrubby: sts. erect-branched: lvs. oblong-spatulate, base attenuate, flat, ciliate, gathered at the tips of the branches in a flat rosette: peduncles minutely glandular: petals linear-lanceolate, very pale sulfur. Canary Isls.

6. **spathulàtum,** Hornem. (*S. barbàtum*, C. Smith. *Æònium barbàtum*, Webb & Berth.). Shrubby: sts. stout; branches horizontal near the st., then arched and erect: rosettes flat, not dense: lvs. of the rosettes oblong-spatulate, acute, margin papillose, both surfaces with linear, red-brown markings; cauline lvs. linear-lanceolate, acuminate: fls. 8–10-merous, in rather open panicles, the fls. on the upper side of the branches; calyx-segms. deltoid; petals oblong-lanceolate, acute. Canary Isls.—Some of the material grown under this name is certainly not the species above described, but probably a form of *S. tectorum*.

7. **Heûffelii,** Schott (*S. pátens*, Griseb. & Schenk). Barren rosette 1½–2 in. diam., the young rosettes not peduncled: lvs. 30–40 to a rosette, obovate-cuneate, distinctly cuspidate, glabrous, lower part pale green, upper third or even half tinted bright red-brown, margin crowded, stiff, white-ciliate, outer lvs. ¾–1 x ⅜in.;

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cauline lvs. close, red-brown, lanceolate, ¾–1 in. long: fl.-st. including the infl. 6–8 in. high, densely short-pubescent: fls. 6-merous, pale straw-color, in a dense panicle 2½–3 in. diam.; calyx-teeth linear-oblong, finely glandular-pubescent on the back and red-brown when old; petals ⅜in. long, linear-oblong, obtuse, with 3 small cusps, keeled and finely glandular outside. Transylvania and Greece in the mountains.—One of the latest in flower.

8. **Reginæ-Amàliæ,** Heldr. & Sart. Rosettes about 3 in. diam., the new ones sessile: lvs. 100 or more to a rosette, obovate-cuneate, distinctly cuspidate, all bright purplish brown in the upper half, green only toward the base, glabrous, margin ciliate, outer lvs. 1–1¼ x ⅛–⅜in.; cauline lvs. crowded, lanceolate, brown, slightly pubescent: fl.-st. including infl. 6 in. high, densely pubescent: fls. 6–7-merous, pale yellow, in a dense many-fld., capitate panicle; calyx finely glandular-pubescent, segms. lanceolate; petals lingulate, obtuse, obscurely tricuspidate, densely glandular externally. Mountains of Greece.

9. **soboliferum,** Sims (*S. globiferum*, Linn. as to synonyms and many other authors, not Linn. as to plant cited). Hen-and-Chickens. Houseleek. Barren rosettes globose, 1–1½ in. diam., the copious new rosettes sessile and attached to the parent only by a slender thread and easily becoming detached from it and rolling about: lvs. 60–80 to a rosette, obovate-cuneate, obscurely cuspidate, pale light green, glabrous, margin minutely ciliate, outer ones tinted with red-brown especially on their back, ¾–1 x ¼–⅜in.; cauline lvs. very densely crowded, ovate-lanceolate, acute: fl.-st. including infl. 6–9 in. high, very robust, finely pubescent: fls. 6–7-merous, pale yellow, in a short, dense, many-fld. panicle, which is 3–4 in. diam.; calyx-segms. lanceolate, nearly glabrous on the back, margins strongly ciliate; petals lanceolate, ½in. long, obscurely tricuspidate, margins conspicuously fimbriate. Mountains of Austria. B.M. 1457.—Unless the young rosettes are thinned out the plants are not so apt to flower.

10. **arenàrium,** Koch. (*S. Neilreìchii*, Schott, Nym. & Kotschy). Rosettes globular, deciduous: lvs. 60–80 to a rosette, oblanceolate, acute, bright green, glabrous, outer lvs. slightly tinted red-brown on the back, ½–¾in. long; cauline lvs. ovate-lanceolate: fls.-sts. including the infl. 6–9 in. high, crowded, leafy and finely pubescent: fls. 6-merous, pale yellow, many in a dense head, 2–3 in. diam.; sepals lanceolate; petals lanceolate, ½–⅝in. long, distinctly tricuspidate with a linear end tooth. Tyrol. Gn. 49, p. 220.

11. **hirtum,** Linn. (*S. Alliònii*, Nym. *S. cornùtum*, Hort.). Developed barren rosettes 1–1¼ in. diam., the new ones not rolled up into balls and breaking away as in *S. soboliferum:* lvs. about 50 to a rosette, obovate-cuneate, not distinctly cuspidate, pale gray-green, surfaces finely glandular-pubescent, margins glandular-ciliate, outer lvs. faintly tinted red, ½–¾ x ⅛in.; cauline lvs. crowded, pubescent, the upper cordate-ovate: fl.-st. including infl. 6–9 in. high, densely pilose: fls. usually 6-merous, pale yellow, in a few- to many-fld. panicle which is 1½–4 in. diam.; calyx-segms. lanceolate, hairy on their back; petals ½–¾in. long, lanceolate, tricuspidate, the middle tooth conspicuous, keel prominent, tinted greenish red and is densely glandular. S. Eu.

12. **Wülfenii,** Hoppe. Developed rosettes 1½–2 in. diam., the new ones nearly sessile: lvs. about 50 to a rosette, obovate-cuneate, cuspidate, slightly glaucous, with only a faint tint of red-brown at the very tip, outer lvs. ¾–1 x ⅜in.; cauline lvs. lanceolate, 1–1½ in. long: fl.-st. including infl. 6–9 in. high, densely pilose upward: fls. 12–14-merous, pale yellow, in a short dense panicle which is 2–3 in. diam., its branches densely pilose; calyx short-pilose, segms. lanceolate; petals linear, densely glandular-puberulent externally. Mountains of Cent. Eu.

13. **álbidum,** Schnittsp. & Lehm. Rosettes large, the young ones 1–3 in. away from the old one: lvs. of rosettes ovate-lanceolate, narrowed at their base, apex rather long-acuminate, glabrous, finely ciliate, dark grass-green, tips reddish brown; cauline lvs. equally broad, long-acuminate: fls. whitish, racemose paniculate; petals linear-lanceolate. Hab.(?).

14. **Pittonii,** Schott., Nym. & Kotschy. Rosettes 1–1½ in. diam., always open, the young ones sessile: lvs. 60–80 to a rosette, ensiform, lingulate or oblanceolate, apex abruptly deltoid-pointed, pale green with large light red blotches, outer lvs. ¾in. long; cauline lvs. dense, lanceolate, red-blotched and purple-tipped, densely glandular-hairy: fl.-st. including infl. 4–6 in. high, glandular-hairy ending in a 3-branched, dense corymbose infl.: fls. 12–20, small, 9–12-merous, yellowish white; petals linear-lanceolate, about ⅜in. long, glandular-hairy on the margin and back. Styria.—Rare in cult.

15. **rupícolum,** Kern. Rosettes 1½–2 in. diam., the young ones on glandular-hairy peduncles which are 1½–2½ in. long: lvs. elongated-obovate, ½–1¼ x ¼–⅜in., narrowed gradually from the upper one-third to the reddish base, cuspidate, slightly scattered glandular-hairy; cauline lvs. ovate-lanceolate, ⅜–¾in. long, tip reddish: fl.-st. slender, glandular-hairy: fls. 12-merous, pale greenish yellow, striped red; calyx-segms. oblong; petals narrowly linear-lanceolate, acute. Tyrol. —Probably a hybrid; *S. montanum* × *S. Wulfenii.*

16. **globíferum,** Linn. in part, excl. synonymy (*S. ruthénicum*, Koch). Rosette 1½–3 in. across, rather flattened, the young ones globular, borne on scaled peduncles which are rather stout and about 1½–3 in. long: lvs. obovate-cuneate to elliptical, gray-green, cuspidate; cauline lvs. oblong, acute, about 1¼ x ⅓in., tip often red-brown: fl.-st. about 1 ft. high, including infl., densely short-hairy: fls. pale yellow, 12–14-merous, about ¾–1 in. across; calyx-segms. lanceolate, acute; petals linear-lanceolate, acute, externally glandular-hairy and green-striate, margins glandular-ciliate. Russia in Eu.—As Koch points out in Flora 18, part 1:209, t. 1 (1835), the synonymy given by Linnæus undoubtedly refers to *S. soboliferum*, a 6-merous species, but that the one plant Linnæus cites and his "habitat in Rutheno. D. Gmelin" undoubtedly refer to the 12-merous plant which Besser knew under the name *S. globiferum* and which he, Besser, sent to Koch in 1834.

17. **grandiflòrum,** Haw. (*S. globíferum*, Sims, not Linn.). Rosettes about 1½ in. diam., the new ones on decumbent peduncles 1–2 in. long, which have small lvs.: lvs. about 40 to a rosette, obovate-cuneate, obscurely cuspidate, pale green, pubescent, only the tip obscurely red-brown tinted, outer lvs. ¾–1 x ¼–⅓ in.; cauline lvs. crowded, lanceolate, ¾–1 in. long: fl.-sts. including infl. 3–8 in. high, densely pubescent: fls. 12–14-merous, 1¼–1½ in. across, pale yellow, subsessile in a dense paniculate head; calyx pubescent, segms. lanceolate; petals lanceolate, acuminate, back glandular. Hab.(?). B.M. 507; 2115(?).

18. **heterótrichum,** Schott. Rosettes 1–1½ in. diam.: fl.-sts. 3–6 in. high, puberulent pubescent: lvs. of the rosette spatulate-linear, apex acute, with a tuft of hairs and also long web-hairs connecting the lf.-tips, puberulent at the apex above, glabrous beneath, glaucous; cauline lvs. lanceolate-linear, puberulent on both sides: infl. puberulent; fls. 9–12-merous, rose, in a racemose panicle; calyx-segms. lanceolate-linear, acute; petals lanceolate, acuminate, ciliate, apex barbulate. S. Eu.—Closely allied to *S. Doellianum* and *S. arachnoideum.*

19. **Moggridgei,** De Smet. Rosettes 2 in. diam.: lvs. about 100 to a rosette, ¾in. long, elongate-cuneate or oblanceolate, green, glabrous, margins minutely ciliate,

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tips acute and hairy tufted; cauline lvs., the lower oblanceolate, ¾in. long, tips bearded, pale green, tips reddish, the upper more oblong: cyme 3–4 times forked: fls. 10–12-merous, ¾in. diam.; calyx glandular-pubescent, segms. linear, obtuse; petals lanceolate, acuminate, apiculate. S. Eu. B.M. 6610.—Allied to *S. arachnoideum*.

20. **arachnoídeum,** Linn. (*S. Haùsmannii*, Auersd., not Lehm. & Schnittsp. *S. pilíferum*, Jord.). COBWEB or SPIDER-WEB HOUSELEEK. Fig. 3601. Barren rosettes ½–¾in. diam., the new ones crowded and sessile: lvs. about 50 to a rosette, oblong-cuneate, obscurely cuspidate, pale green, tips of nearly all the lvs. connected with long soft white hairs, outer lvs. tinted with red-brown on the back, about ⅜in. long; cauline lvs. oblong-lanceolate, small, tips with a dense tuft of hairs: fl.-sts. 3–4 in. high including the dense few-fld. panicle: fls. 9–12-merous, about 1 in. across; calyx-segms. linear; petals lanceolate, bright red. S. Eu. B.M. 68. G.L. 26:201. Gn. 78, p. 437. Var. **tomentòsum,** Cariot (*S. tomentòsum*, Schnittsp. & Lehm. *S. Webbiànum*, Hort.), has white tomentose rosettes, with more obovate-cuneate lvs. and the rosettes are flatter and more compact. Var. **Hoòkeri,** Hort., is offered in the trade. Var. **mìnor,** Hort., is offered in the trade. Var. **rùbrum,** Hort., is offered in the trade.

3601. Sempervivum arachnoideum. (×½)

21. **Doelliànum,** C. B. Lehm. Barren rosettes ½–¾in. diam., the new ones shortly peduncled: lvs. 40–50 to a rosette, oblanceolate, obscurely cuspidate, pale green, surface slightly hairy, the tips of only the inner ones connected by a few arachnoid threads, the outer ¼–⅜in. long, tinted with red on the back; cauline lvs. lanceolate, ½–¾in. long, with only an obscure tuft of short hairs at the tips: fl.-st. including infl. 4–6 in. high: fls. 9–10-merous, bright red, in a compact, few-fld. panicle; calyx densely pubescent, segms. lanceolate; petals lanceolate, ⅓in. long. Switzerland and Tyrol.—Closely allied to *S. arachnoideum*, by some authorities considered a variant of it.

22. **Lággeri,** Schott (*S. arachnoídeum* var. *Lággeri*, Rouy. & Fouc.). Rosettes up to ⅞in. diam., open, the young ones close to the old ones or on peduncles up to 1¼ in. long: lvs. gray-green, red-violet at the tip, short glandular-hairy, at least above, lingulate, about ⅓in. long, apex blunt, suddenly apiculate; cauline lvs. ⅝–⅞in. long, rather close, hairy, tip tufted hairy and red- or black-violet and red- or black-violet-dotted: fls. bright rose, in a rather dense panicle borne on a reddish st.; calyx-segms. ovate-elongated, acute; petals oval-lanceolate with the midnerve darker. Switzerland. Gn. 78, p. 470.—Closely allied to *S. arachnoideum* and considered a variety of it by some authorities. There is a strong-growing variant of this species offered in the trade under the name *S. arachnoídeum* var. *Lággeri gigantèa*, Hort.

23. **Haùsmannii,** Lehm. & Schnittsp. Rosette medium-sized, somewhat flat: lvs. of the rosette ovate, cuspidate, glabrous, margins ciliate, tip ciliate-tufted, green, brownish at the tip: fl.-st. 5–6 in. high, erect: fls. 12–14-merous, rose-red in a dense many-fld. panicle; calyx-segms. ovate-lanceolate, acute, glandular-ciliate; petals ovate to linear-lanceolate, lower surface keeled, margin glandular-ciliate. Tyrol.

24. **Pómelii,** Lamotte; also misspelled *Poemlii*. Barren rosette 1½–1¾ in. diam., the new ones nearly sessile: lvs. 50–60 to a rosette, oblanceolate, with a distinct cusp, a few hairs on both surfaces, the cusp furnished with an inflexed tuft of hairs, outer lvs. ¾–1 x ¼in., tinged with red; cauline lvs. much imbricated, lanceolate, hairy, the lower 1–1½ in. long: fl.-st. including infl. 6–9 in. high, densely pilose: fls. 10–12-merous, about 1 in. across, rose-red, in a panicle 3–4 in. diam., its simple branches 6–12-fld.; calyx densely pilose, segms. linear-lanceolate, glandular; petals linear-lanceolate. France.

25. **fimbriàtum,** Schnittsp. & Lehm. Barren rosette 1–1½ in. diam., the new rosettes nearly sessile: lvs. 50–60 to a rosette, oblanceolate, obscurely cuspidate, green, margins deflexed hairy, tip with a tuft of hairs, outer lvs. becoming red, ½–¾in. long; cauline lvs. pilose, lanceolate, red-tinted, much imbricated, lower ones 1–1½ in. long: fl.-sts. including infl. 6–10 in. high, densely glandular-pilose: fls. about 12-merous, 1 in. across, bright red, in an open few-branched panicle; calyx glandular-pilose, segms. linear-lanceolate; petals lanceolate. Pyrenees and Tyrol. Gn. 78, p. 47.

26. **assímile,** Schott. Rosettes of barren lvs. 1½–2 in. diam., the new ones nearly sessile: lvs. 60–80 to a rosette, obovate-cuneate, cuspidate, pale glaucous green, not red-tipped, margin short-ciliate, surface minutely pubescent, outer lvs. ¾–1 in. long: fl.-sts. including the infl. about 6 in. high: fls. 12-merous, about ¾in. across, pale rose; calyx-segms. lanceolate; petals linear. Transylvania.

27. **pùmilum,** Bieb. (*S. anómalum*, Hort.). Barren rosette at most 1 in. diam., the copious new rosettes shortly peduncled: lvs. 30–40 to a rosette, oblanceolate, cuspidate, green, pubescent, end mucro obscure, outer lvs. only tinted red-brown, ⅜–½ x ⅛in.; cauline lvs. lanceolate, hairy all over, tinted red-brown, the lowest ½–¾in. long: fl.-st. including infl. not more than 3–4 in. high: fls. few (4–8), about 12-merous, 1 in. across, bright mauve-purple, in a dense head, all sessile or subsessile; calyx very hairy, segms. lanceolate; petals acuminate, very hairy outside. Caucasus.

28. **montànum,** Linn. Barren rosette 1½–1¾ in. diam., the few new rosettes on red pilose peduncles 1–1½ in. long: lvs. closely packed, 60–80 to a rosette, oblanceolate-cuneate, cuspidate, green up to the tip, both surfaces slightly pilose, outer lvs. ¾–1 x ⅓in.; cauline lvs. densely imbricated, lanceolate, tinted with red-brown toward the tip, the lower 1–1½ in. long; fl.-st. including infl. 3–6 in. high: fls. 12–14-merous, bright mauve-red, in a very dense panicle, which is 1½–2 in. diam.; calyx very hairy, segms. lanceolate; petals ½–⅝in. long, linear-acuminate. Alps and Pyrenees. Var. **glaciàle,** Lagg. (*S. Lèhmannii*, Schnittsp.). Lvs. linear-lingulate, base somewhat narrowed, apex bluntly pointed, upper surface weakly glandular-pubescent; cauline lvs. similar but shorter and brown-tipped: fls. dirty red-brown, 10–12-merous; calyx-segms. linear-lanceolate; petals linear. Switzerland.

29. **flagellifórme,** Fisch. Barren rosette 1–1½ in. diam., with the lax new rosettes on long spreading peduncles and the small lvs. not aggregated into a dense erect head: lvs. 40–50 to a rosette, oblanceolate, obscurely cuspidate, surface minutely downy, pale green without a tint of red-brown at the tip, margin ciliate, outer lvs. ¾ x ¼in.; cauline lvs. imbricated, lanceolate,

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hairy, lowest about 1 in. long: fl.-st. 3–4 in. high including the infl.: fls. about 12-merous, about 1 in. across, bright red, about 6–8 in a dense head, sessile, or nearly so; calyx densely pilose, segms. lanceolate; petals linear, acuminate, densely glandular-pilose outside. Siberia(?).

30. **Schnittspahnii,** Lagg. (*S. Fúnkii*, Lej.). Rosette medium-sized, open, the young ones on straight peduncles ½–1 in. long: lvs. of rosette ovate-lanceolate, with a short hair point, glabrous, margin white-ciliate, dark green, tip red-brown, keeled beneath; cauline lvs. lanceolate: fl.-st. erect, furrowed, at top slightly winged, white-hairy: fls. brown-rose, later rose, more than 6-merous; petals broadly lanceolate. Switzerland.

31. **Metteniànum,** Schnittsp. & Lehm. (*S. parviflòrum*, Lehm. & Schnittsp.). Rosettes flat, 1¼–2 in. diam., the young ones on peduncles 3–4 in. long, which are commonly lvd. below: lvs. ovate-lanceolate, cuspidate, base narrowed, glabrous, margin ciliate, gray-green marbled with grass-green, tip red-brown; cauline lvs. long, straight-acuminate, appressed: fl.-st. spreading, white-hairy, bearing a racemose panicle: fls. rose; petals linear-lanceolate. Cent. Eu. G.M. 57:847.—Allied to *S. tectorum*.

32. **blándum,** Schott (*S. rubicúndum*, Schur). Sts. 7–10 in. high, they and the branches of the propagations densely puberulent: rosettes 1½–2 in. diam.: lvs. of the rosettes obovate-spatulate, short-cuspidate, margin ciliate, glaucous; cauline lvs. spreading, linear-oblong, apiculate-cuspidate, both surfaces softly-puberulent: infl. puberulent and pilose: fls. 12-merous, pale rose; sepals lanceolate, acute; petals lanceolate, acuminate, midnerve deeper colored. Transylvania.

33. **Lamóttei,** Bor. Barren rosettes 3–4 in. diam., the copious young rosettes sessile: lvs. obovate-cuneate, cuspidate, glabrous, marginal cilia stiff, outer lvs. 1¼–1½ x ½–¾in., green or faintly glaucous, with only the faintest tint of red-brown at the tip: fl.-st. including infl. often more than 1 ft. high, densely glandular-pilose: fls. 12–16-merous, 1 in. across, pale pink, in a panicle with the main branches often bifid; calyx densely pilose, segms. linear-lanceolate; petals narrow. France.—Has been referred to *S. tectorum* by some authors.

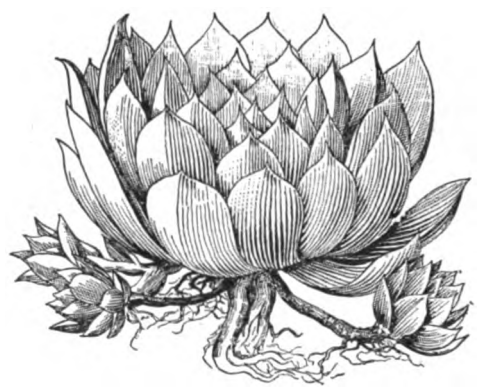
34. **tectòrum,** Linn. (*S. robústum*, Jord. & Fourr. *S. purpurascens*, Schott). HOUSELEEK. OLD-MAN-AND-WOMAN. Fig. 3602. Developed barren rosettes 3–4 in. diam., abundantly stoloniferous, the new rosettes crowded and sessile: lvs. 50–60 to a rosette, obovate-cuneate, cuspidate, 1½–2 or finally 3 x ⅝–¾in., pale green, with a distinct red-brown tip; cauline lvs. oblong-lanceolate, acute: fl.-st. including infl. about 1 ft. high, densely pilose: fls. 11–15- mostly 12-merous, ¾–1 in. across, pale red, in a scorpioid, 10–12-branched panicle 5–6 x 3–4 in.; calyx densely pilose, segms. lanceolate; petals linear, keeled, the keel deeper red. Eu. and Orient. C.L.A. 25, March, p. 54.—Variable. Var. **cúpreum,** Hort., is said to have large rosettes which are glaucous and rose-colored; it flowers rarely. Var. **expánsum,** Hort., is said to have broader lvs. and more open rosettes than the type. Var. **pyrenàicum,** Hort., is offered in the trade. Var. **rúbrum,** Hort., has been grown in botanic gardens. Var. **violàceum,** Hort., has been grown in botanic gardens.

35. **Fúnckii,** F. Braun; also spelled *Funkii*. Barren rosettes 1½–2 in. diam. surrounded by a dense circle of young ones on bright red decumbent peduncles, which are 1 in. or more long and densely rosulate at their tip: lvs. 80–100 to a rosette, oblanceolate-cuneate, cuspidate, green and glabrous or slightly pilose when young, outer lvs. ½–¾ x ¼in., lower cauline lvs. about 1 in. long: fl.-st. including infl. 6–9 in. high, densely pilose: fls. 11–12-merous, about 1 in. across, bright red-purple, in a panicle 2–3 in. diam.; calyx-segms. lanceolate; petals glandular-pubescent outside. S. Eu.—Allied to *S. montanum*.

36. **glaùcum,** Tenore (*S. Comóllii*, Rota. *S. acuminàtum*, Schott, not Jacquem. *S. Schóttii*, Baker, not Schnittsp. & Lehm. *S. Schlèhanii*, Schott). Barren rosettes 2–3 in. diam., the copious young ones sessile or nearly so: lvs. oblanceolate-cuneate, cuspidate, glabrous, glaucous, with a slight red-brown tip, outer lvs. 1–1¼ x ⅜–½in.; cauline lvs. oblong-lanceolate, red-tinted, lowest 1–2 in. long: fl.-st. including the infl. 6–12 in. high, densely pilose, at least above: fls. 12–14-merous, about 1 in. across, pale or bright red, in a short compact panicle, 2–3 in. diam.; calyx densely pilose to glandular-pilose, segms. lanceolate; petals somewhat keeled. Cent. Eu.—The synonymy is much involved and by some authorities *S. Comollii* is said to be a hybrid, *S. acuminatum* and *S. Schottii* synonymous and distinct, and *S. Schlehanii* also distinct, but the differences seem extremely weak.

37. **Verlóttii,** Lamotte. Barren rosettes 1½–2 in. diam., the new ones nearly sessile: lvs. about 50 to a rosette, oblanceolate-cuneate, cuspidate, glabrous, pale green, faintly glaucous, only the very tip tinged with red-brown, margin stiff-ciliate, outer lvs. ¾–1 x ¼–⅓in.; cauline lvs. oblong-lanceolate, acuminate, lowest about 1 in. long: fl.-st. including the infl. 6–9 in. high: fls. 12–14-merous, ¾–⅞in. across, rose-red, in a panicle 3–4 in. diam., simple glandular-pilose branched, each branch with 8–12 fls.; calyx densely glandular-pilose; petals densely ciliated on the back. Alps of Dauphiné.

38. **atlánticum,** Baker (*S. tectòrum* var. *atlánticum*, Ball). Barren rosettes 2–3 in. diam., the young rosettes nearly sessile: lvs. oblanceolate-cuneate, cuspidate, pale green, glabrous when mature, hardly at all tipped with red-brown, outer lvs. 1–1½ in. long, ⅓in. broad above the middle; cauline lvs. oblong-lanceolate, noticeably claret-red-tipped: fls.-st. including infl. nearly 1 ft. high: fls. 12-merous, pale red, 1 in. across, in a short panicle, 3–4 in. diam.; calyx densely pilose; petals linear, acuminate. Morocco. B.M. 6055.



3602. Rosette and offsets of a houseleek.—Sempervivum tectorum. (×½)

39. **tríste,** Hort. Barren rosettes 2–3 in. diam.: lvs. oblanceolate-cuneate, cuspidate, glabrous, margin short-ciliate, lower part dull drab-green, the whole upper part bright red-brown; cauline lvs. red-brown throughout, lower ones 2–3 in. long: fl.-st. robust as in *S. tectorum*: fls. about 1 in. across, bright red, in a panicle 6 x 3–4 in.; calyx moderately hairy, deeply tinted with red-brown. Hab.(?).—A rare form allied to *S. tectorum*. Var. **bícolor,** Hort., is offered in the trade.

40. **Greènii,** Baker. Barren rosette about 1½ in. diam., the new ones nearly sessile: lvs. 40–50 to a rosette, oblanceolate-cuneate, cuspidate, glabrous, glaucous with a distinct red-brown tip ⅛–⅙in. long, margins decurved ciliate, outer lvs. ¾–1 x ¼in., cauline lvs. much imbricated, lanceolate, hairy, red-tinted, ¾–1 in. long: fl.-st. including infl. 6 in. high: fls. 11–12-merous,

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about ½in. across, pale red, in a panicle 1½–2 in. diam.; calyx densely pilose; petals densely ciliated. Habitat unknown, possibly the French Alps.

41. **calcàreum,** Jord. (*S. californicum*, Hort.). Barren rosettes about 2 in. diam., young ones nearly sessile: lvs. oblanceolate-cuneate, cuspidate, very glaucous, with a very distinct red-brown tip, glabrous, outer lvs. 1–1½ x ⅜in.; cauline lvs. densely imbricated, oblong-lanceolate, 1–1½ in. long: fl.-st. less than 1 ft. high, including the infl.: fls. 10–12-merous, ¾in. across, pale red in a panicle 3–4 in. long, with 8–12 simple scorpioid branches; calyx densely pilose, segms. lanceolate; petals greenish down the keel, densely ciliate. France on the calcareous alps of Dauphiné.

42. **arvernènse,** Lecq. & Lamotte. Barren rosette 1½–2½ in. diam., copiously stoloniferous: lvs. about same number as in *S. tectorum*, oblanceolate-cuneate, cuspidate, bright pale green, glabrous, tips of lvs. with a distinct red-brown blotch ⅛–⅙in. long, outer lvs. 1–1¼ in. long: fl.-st. including infl. 6–8 in. high, densely pilose: fls. pale pink, in a panicle 2–3 in. long and broad, the lower fls. distinctly pedicelled; calyx-segms. lanceolate; petals linear. France.

43. **Boutignyànum,** Bill. & Gren. Barren rosette 2–3 in. broad, copiously stoloniferous: lvs. oblanceolate-cuneate, cuspidate, glabrous, green, with a distinct, decurrent red-brown tip, outer lvs. 1–1¼ in. long; cauline lvs. lanceolate, 1 in. or more long: fl.-st. including infl. 6–8 in. long, short-pilose: fls. 12–14-merous, about ¾in. across, pale rose, in a panicle 2–3 in. diam. which has 8–12 crowded fls.; calyx-segms. lanceolate; petals densely glandular-ciliate. Eu.—Botanically probably a variant of *S. arvernense*.

44. **alpìnum,** Griseb. & Schenk. Rosettes 2–3 in. diam.: lvs. of rosettes oblanceolate, base cuneate, apex short-acute, glabrous, green, red-tipped; cauline lvs. oblong to lanceolate, acuminate, sparsely pilose beneath: fls. purple-reddish in a panicle, star-like, expanded; petals 12, linear-lanceolate, glandular-ciliate, dorsally obscurely striate. Eu.—Botanically it is probably only a variant of *S. arvernense*, though referred by some authorities to *S. montanum*.

45. **Boissieri,** Hort. Barren rosette very dense, 2–2½ in. diam., composed of about 100 lvs.; new rosettes short-peduncled: lvs. oblanceolate-cuneate, cuspidate, broadest near the middle, glabrous, green, noticeably red-brown-tinted at the tip, 1–1¼ in. long; cauline lvs. closely imbricated, red-tinted, oblong to lanceolate: fl.-sts. including the infl. 8–9 in. high.: fls. pale red, 12–14-merous, about 1 in. across, in a panicle about 2 in. diam. Hab.(?).

S. affine, Lamotte, is offered in the trade as having dark green rosettes marked with rose: fls. red. Eu. The botanical description is not available and the species is not treated in recent European floras.—*S. atropurpùreum*, Hort., is offered in the trade as having rosettes washed with purple: fls. red.—*S. chrysantholdes*, Hort., is offered in the trade as a form with white fls.—*S. ciliòeum*, Craib. Barren rosettes more or less flat, up to 1¼ in. diam.: lvs. oblong-lanceolate, more or less acuminate, up to ¾in. long, keeled beneath, conspicuously long white-ciliate toward the apex, pubescent above, outer lvs. red-tinted; cauline lvs. imbricate, tip red-suffused: fl.-sts. about 2 in. high, bearing about 6 subsessile fls.: fls. about 1 in. across, pale green, 9–11-merous; calyx-segms. oblong-lanceolate, acute, glandular-pubescent; petals linear, glandular-pubescent externally. Hab.(?). Grown in botanic gardens.—*S. cólchicum*, Hort., is offered in the trade.—*S. commutàtum*, Hort., is offered in the trade.—*S. Delpóntii*, Hort., is a trade name.—*S. élegans*, Lagg. Rosettes small, about ½in. diam., the young ones on short shoots forming a mat: lvs. linear-lanceolate, cuspidate, short-villous, weakly cobwebbed, pale green, slightly ciliated; cauline lvs. numerous, slightly separated, oval-lanceolate, brown toward their tip and tufted ciliate: fl.-st. weak, almost prostrate on the ground during flowering and glandular-hairy; petals oval-lanceolate, acuminate. Switzerland. Not treated in any of the recent Swiss floras but offered in the trade.—*S. hispánicum*, Willd., is a doubtful species with subulate, semi-terete, ciliate, imbricated lvs.; possibly a Sedum.—*S. hispánicum*, Pourr., equals Sedum nicæense.—*S. hispidulum*, Hort., is offered in the trade.—*S. hispidum*, Hort., is a horticultural name.—*S. hùmilum*, Hort., is a horticultural name.—*S. kopaonikénse*, Panc., is said to be related to S. Heuffelii by Pancic, but is not well known and it is suggested that it is only a form of that species by recent authors. Serbia.—*S. Lòggei*, Hort., is presumably an error for Laggeri.—*S. leucánthemum*, Hort., is probably an error for leucanthum.—*S. leucánthum*, Panc., is described as a form with rather small rosettes, 12-merous fls. and white petals, grown in gardens, now questionably referred to S. tectorum.—*S. marginàtum*, Hort., is offered in the trade.—*S. pilòsum*, Hort., is a trade name.—*S. pyrenàicum*, Lamotte, is offered in the trade as having handsomely formed and dark red rosettes. Eu. The botanical description is not available and the recent European floras do not treat this species.—*S. rùbens*, Hort., is offered in the trade.—*S. rubrùm*, Hort., is offered as having a dark base to the lvs., possibly the same as S. tectorum var. rubrum.—*S. rupéstre*, Hort., is a trade name, perhaps a form of S. tectorum.—*S. Scherzeriànum*, Hort., is offered in the trade.—*S. speciòsum*, Lamotte, is offered in the trade. Eu. The botanical description is not available and none of the recent European floras mentions it.—*S. spinòsum*, Hort., is a trade name.—*S. spinulifòlium*, Hort., is offered in the trade and also occurs in botanic gardens.—*S. Thómsonii*, Lindsay (*S. arachnoideum* × *S. tectorum*), is offered in the trade; no description of the hybrid is available.—*S. umbìcilum*, Hort., is a trade name. Var. *spinòsum*, Hort., is a trade name perhaps the same as the plant offered in the trade as S. spinosum.—*S. virbicum*, C. Smith. Shrubby: st. erect, 3 ft. high, simple, stout, covered with lf.-scars: lvs. many, rosulate at the top of the st., 4–6 x 1½ in., narrowly spatulate, cuspidate, very thick, pale green, margins erosely serrulate, sessile or short-petioled: panicle very large, pyramidal, 3 ft. high and nearly as broad, many-branched; fls. 10-merous, pale yellow, ¾in. across; calyx cup-shaped; petals lanceolate, acute. Canary Isls. B.M. 7893. Belongs to the same group as S. arboreum. A very showy species but tender.—*S. violàceum*, Hort., is offered in the trade; possibly the same as S. tectorum var. violaceum.—*S. Zelébori*, Schott. Barren rosette more than 2 in. diam., the young ones borne on densely puberulent peduncles: lvs. spatulate-oblanceolate to spatulate-lingulate, apex apiculate and purple, short-ciliate, both surfaces densely puberulent, glaucous; cauline lvs. smaller, linear-lingulate, apiculate and puberulent: fl.-st. minutely glandular and densely hirsute: fls. 11–12-merous, pale yellowish; calyx-segms. lanceolate; petals linear-lanceolate, acuminate, viscid hirtellous dorsally. Serbia. By some authorities referred to S. Pittonii, by others to S. globiferum; apparently distinct from both of them.

F. TRACY HUBBARD.

SENEBIÈRA (after Johann Senebier, a naturalist of Geneva). *Cruciferæ*. Annual or biennial herbs, very diffusely branched from the ground, hardy: lvs. alternate, entire or pinnatisect: racemes short; fls. minute, white, rarely purple; sepals short, spreading; stamens free: silique small, didymous, laterally compressed; valves shut, subglobose, rugose or crested.—About 15 species in the temperate and warmer regions of the world.

The oldest name of the genus and the one now accepted by those following the International rules is **Coronòpus** (Greek *crow* and *foot*, alluding to the form and arrangement of the deeply cut lvs.). **C. dídymus,** Smith (*Senebièra didyma*, Pers. *S. pinnatífida*, DC. *Lepídium dídymum*, Linn. *Cardàra dídyma*, Brit.). Plant 6–12 in. high: lvs. 1–2-pinnately parted: fls. white, small, numerous: pods notched at the apex, rough-wrinkled. Widely distributed as a cosmopolitan weed.

SENÈCIO (Latin name for plants of this genus, ultimately from *senex*, "old man;" said to be in allusion to the hoary pappus). *Compósitæ*. GROUNDSEL. A various group, some of the herbaceous members of which are grown as border plants for their mostly yellow heads and sometimes for the striking habit; others are climbers, grown mostly indoors, as the so-called German ivy; the shrubby kinds are little known in cultivation.

Senecio is probably the largest genus of plants, comprising some 1,200 species in all parts of the world. A genus comprising so many members and being so widely distributed is necessarily variable and therefore practically impossible of concise definition. A distinguishing mark of the senecios lies in the character of the involucre,—scales or bracts in one series, and usually reinforced at the base by shorter scales or bracteoles that give the head the appearance of having a small calyx. Heads usually radiate, the ray-florets pistillate and fertile, but sometimes the rays absent and then the head is homogamous (florets all of one kind, i. e., perfect); disk-florets tubular, 5-toothed; style-branches subterete, truncate, rounded-obtuse, occasionally terminated by a small penicillate tuft of hairs; receptacle usually naked: achenes mostly terete and ribbed; pappus of soft whitish, often copious bristles. Most of

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the senecios are yellow-rayed. Of the vast number of species, very few have gained prominence in horticulture.

To Senecio belong the genera known to gardeners as Jacobæa, Kleinia, and Cineraria. The latter is a Senecio, although the florist's cineraria is described under that name in Vol. I of this work. Bentham & Hooker refer to Senecio the genus Cacalia, which is kept distinct by American botanists. Hoffman (in Engler & Prantl's Natürl. Pflanzenfamilien) refers the garden genus Emilia to Senecio, but keeps Ligularia (including Farfugium) and Cineraria (not the florist's cineraria) distinct. See *Emilia;* also *Ligularia.*

If the greenhouse cineraria (which is technically a Senecio as understood by Bentham & Hooker) is omitted, the most popular species are *S. mikanioides* or German ivy, *S. elegans* or purple ragwort, *S. pulcher*, and *S. Cineraria*, one of the plants commonly known as dusty miller. Various other plants are known as dusty miller, and one of them, *Artemisia Stelleriana*, is sometimes confounded with *Senecio Cineraria.* Most other species are of very minor importance to the horticulturist. Several species are found in the European trade, and of the sixty or more species native to the United States and Canada, about a half dozen have been offered by dealers in native plants, but they are practically unknown horticulturally. Most of the species are wholly herbaceous, but in South Africa, Australia, Central and South America many species are shrubby. Some species are even arborescent; others are climbers. In South Africa and the Canaries is a small series of species that has been separated as Kleinia, distinguished mostly by their habit, being for the most part fleshy shrubs or herbs, with terete or angular stems and whitish or pale yellow rayless flowers. Species of this group are sometimes seen in collections of succulents. *S. vulgaris*, Linn., from Europe, is a common annual weed in various parts of this country.

Since senecios afford both greenhouse and hardy border plants, it is impossible to give general cultural directions. The species are not difficult to manage, however, and most of them propagate readily by means of greenwood cuttings and seeds; the hardy species may be divided. Most of the tender species require coolhouse conditions.

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KEY TO THE SPECIES.

A. *St. and lvs. more or less fleshy: heads rayless.*
B. *Lvs. flat, laciniate*..... 1. **articulatus**
BB. *Lvs. terete, undivided*..... 2. **radicans**
AA. *St. and lvs. not fleshy: heads rayless or radiate.*
B. *Habit climbing.*
C. *Heads rayless*..... 3. **mikanioides**
CC. *Heads radiate.*
D. *Plants pubescent*..... 4. **scandens**
DD. *Plants glabrous.*
E. *Lvs. not conspicuously auricled at the base*..... 5. **macroglossus**
EE. *Lvs. conspicuously auricled at the base*..... 6. **auriculatissimus**
BB. *Habit not climbing.*
C. *Annuals.*
D. *Lvs. 1–3 cm. long, deeply pinnatifid*..... 7. **elegans**
DD. *Lvs. 4–10 cm. long, lobate-dentate.* 8. **pulcher**
CC. *Perennials.*
D. *Lvs. pinnately veined.*
E. *The st. herbaceous: plants not densely white-tomentose.*
F. *Rays purple*..... 9. **grandiflorus**
FF. *Rays yellow.*
G. *All lvs. undivided.*
H. *Plants glabrous: involucral bracts not black-tipped.*
I. *Lvs. glaucous*..... 10. **Doria**
II. *Lvs. not glaucous*..... 11. **macrophyllus**
HH. *Plants more or less pubescent.*
I. *Involucral bracts black-tipped.*
J. *Pubescence floccose-woolly.*
K. *Lower lvs. closely dentate*..... 12. **Doronicum**
KK. *Lower lvs. remotely denticulate*..... 13. **lugens**
JJ. *Pubescence of hirsute, jointed hairs*..... 14. **exaltatus**
II. *Involucral bracts not black-tipped*..... 15. **saxifragoides**
GG. *All lvs. or some of them divided.*
H. *St.-lvs. once-pinnate.*
I. *Height of plants 6 in. to 3 ft.: basal lvs. undivided.*
J. *Involucral bracts 13, usually pubescent*..... 16. **Bolanderi**
JJ. *Involucral bracts 21, glabrous*..... 17. **aureus**
II. *Height of plants 4–7 ft.: lvs. all pinnatifid.*
J. *Infl. corymbose*..... 18. **Faberi**
JJ. *Infl. paniculate*..... 19. **tanguticus**
HH. *St.-lvs. 2–3-pinnatisect*..... 20. **Jacobæa**
EE. *The st. herbaceous or distinctly woody: plants usually white-tomentose throughout (sometimes glabrous in S. Douglasii).*
F. *Heads solitary*..... 21. **uniflorus**
FF. *Heads several to many.*
G. *Lvs. all undivided.*
H. *Shape of lvs. oblanceolate.*
I. *Sts. not leafy*..... 22. **fastigiatus**
II. *Sts. leafy*..... 23. **Palmeri**
HH. *Shape of lvs. oblong to ovate; glabrous above*..... 24. **Greyii**
GG. *Lvs. all or some of them divided.*
H. *Lf.-divisions broad, obtuse; bracteoles inconspicuous*..25. **Cineraria**
HH. *Lf.-divisions narrow, acute; bracteoles conspicuous*....26. **Douglasii**
EEE. *The st. woody: shrubs or undershrubs, not white-tomentose.*
F. *Length of lvs. 3–5 in.*
G. *Rays yellow*..... 27. **magnificus**
GG. *Rays white*..... 28. **Kirkii**
FF. *Length of lvs. 6–18 in.*..... 29. **grandifolius**
DD. *Lvs. palmately veined.*
E. *Heads rayless*..... 30. **Prainianus**
EE. *Heads radiate.*
F. *St. woody.*
G. *Lvs. 4–20 cm. broad: heads numerous*..... 31. **Petasitis**
GG. *Lvs. 1–3 cm. broad: heads solitary*..... 32. **Heritieri**
FF. *St. herbaceous*..... 33. **cruentus**

1. **articulâtus,** Schz. Bip. (*Kleinia articulâta*, Haw.). CANDLE PLANT. Plant branching, glabrous and fleshy, 1–2 ft. high, the branches swollen at intervals: lvs. flat and fleshy, petiolate, laciniate or runcinate, with acuminate lobes: heads discoid and all the florets perfect, white, in small corymbs on naked peduncles: achenes downy. S. Afr.—Perhaps the commonest kleinia in cult., being grown with coolhouse succulents. *S.*

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(*Kleinia*) *Anteuphorbium*, Schz. Bip., is sometimes seen in collections, although it is not known to be in the American trade. It is a glabrous shrub 3–4 ft. high, with fleshy sts. constricted at the joints, small, erect, fleshy, entire lvs. that are decurrent on the st., and solitary cylindric yellow-fld. heads (with rose tinge) an inch long. B. M. 6099. According to J. D. Hooker, this

3603. Senecio radicans.

plant "is one of the oldest Cape plants in cult. having, according to Dodonaeus, been brought to Eu. in 1570, and cult. in England in Gerard's garden in 1596. The name Anteuphorbium was given because of its being a reputed antidote against the acrid poison of the Cape Euphorbium." The names *Kleinia spinulosa*, *K. pendula*, and *K. suspensa* have appeared in the American trade, but they are unidentifiable.

2. **radicans,** Schz. Bip. (*Cacalia radicans*, Linn. f. *Kleinia radicans*, Haw.). Fig. 3603. Sts. prostrate, readily rooting from the nodes: lvs. fleshy, cylindrical, straight or somewhat curved, 1 in. or less in length, ¼in. thick, acute, narrowed at the base into a short petiole: peduncle terminal, bearing a single rayless head. S. Afr.—A desirable plant for the rockery; it grows freely among cacti and other fleshy plants.

3. **mikanioides,** Otto (*S. scandens*, DC.). German Ivy. Fig. 3604. Slender and glabrous, tall-twining: lvs. ovate or deltoid-ovate in outline, mostly with a deep basal sinus, sharply 5–7-angled or angle-lobed: heads small, discoid, yellow, in close clusters on axillary and terminal branches; bracts of the involucre shorter than the disk-fls. S. Afr. G. 35:343.—Very common conservatory and window-garden plant, easily prop. by cuttings.

4. **scandens,** Buch.-Ham., not DC. A hardy plant with woody climbing sts. reaching a height of several feet: branches slightly hirsute: lvs. short-petiolate, elliptic-lanceolate in general outline, undivided or bearing two or more divisions at the base of the blade, triangular-dentate, grayish green and finely pubescent on both surfaces: infl. a terminal panicle; heads radiate, rays commonly 8, yellow. China. R.H. 1909, p. 407.—Intro. by de Vilmorin, Verrières-le-Buisson, France.

5. **macroglossus,** DC. Cape Ivy. An herbaceous glabrous climbing perennial: lvs. petiolate, deltoid-hastate, 1–1½ in. long and broad, usually with 2 salient acuminate basal lobes, entire or subdentate, cordate to almost truncate at the base: flowering branches 1–3-headed: heads radiate with 8–12 yellow rays; disk-fls. 40–50: achenes glabrous. S. Afr. G. 26:26.—A coolhouse climber.

6. **auriculatissimus,** Brit. A perfectly glabrous climbing perennial, freely branching with divaricately spreading branches: lvs. petiolate, transversely oblong to subreniform, 2–3 in. broad, coarsely crenate-dentate, bright green above, paler beneath; petioles 1–2 in. long, slender, channeled above, abruptly dilated at the base into 2 broad auricles completely clasping the st.: heads radiate, about 1 in. diam., disposed in loose terminal corymbose cymes; ray-fls. about 13, rays yellow: achenes 5-ribbed, puberulent along the ribs. Brit. Cent. Afr. G. C. III. 27:133, desc. B.M. 7731.—On account of the peculiar foliage and bright yellow fls. it is a striking plant and well worthy of more general cult.

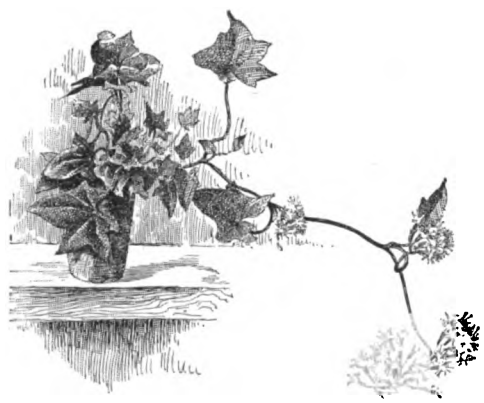
7. **elegans,** Linn. (*S. purpureus*, Hort. *Jacobæa elegans*, Moench). Purple Ragwort. Annual, viscid-pubescent, erect or diffuse, 1–2 ft. high: lvs. various, mostly oblong in outline, pinnate, lobed or toothed, the sinuses chiefly broad and rounded, clasping at the base: heads in loose corymbs, the rays purple; disk-fls. yellow. S. Afr. B.M. 238. Var. **erectus,** Harv. St. slender but erect: lvs. pinnate or 2-pinnatifid.—*S. elegans* is an old garden plant. A common form of it has double fls. Var. **albus,** Hort., has white fls.

8. **pulcher,** Hook. & Arn. Robust, 2–4 ft. high, white-cobwebby: st. simple or nearly so and scarcely leafy: lvs. oblong-lanceolate, 4–10 in. long, thick, shallow-lobed and crenate-toothed: heads 2–3 in. across, with many long, red-purple rays and a yellow disk. Uruguay and Argentina. B.M. 5959. R.H. 1877, p. 94; 1896, p. 329. Gn. 49, p. 122. G.M. 40:745. G. 31: p. 489, desc.—A very bold species, with striking erect habit and large fls. in summer. Perennial, although it has been described as annual. In protected places and well-drained soils, it is hardy in S. New England.

9. **grandifiborus,** Berg. (*S. venustus*, Ait.). An herbaceous perennial 4–5 ft. high: st. simple or sparingly branched, virgate, striate, glabrous or nearly so, rather leafy except toward the infl.: lvs. sessile, pinnately parted into linear divisions with revolute margins, glabrous or sparingly pilose: heads numerous, radiate, strongly calyculate, disposed in a loose nearly naked corymbose cyme; rays purple; disk-fls. yellow: achenes striate, glabrous or puberulent in the furrows. S. Afr. B.R. 901. Var. **albidus,** Harv. (*S. albidus*, Mey.). Both ray- and disk-fls. pale or whitish.

10. **Doria,** Linn. Erect, 3–4 ft. high: radical lvs. oval-oblong or oblanceolate, 6–15 in. long, dentate, glabrous and glaucous, gradually narrowed into a winged petiole; st.-lvs. oblong-lanceolate, sessile and somewhat decurrent: heads yellow, with 5 or 6 rays. Eu.—Hardy perennial.

11. **macrophyllus,** Bieb. (*Jacobæa macrophylla*, Mey.). A stout herbaceous perennial, 3–4 ft. high, glabrous or nearly so: lower lvs. obovate-oblong or oblanceolate, 6–18 in. long, 1–4 in. broad, gradually narrowed into a winged petiole, pale green, not glaucous; upper st.-lvs.



3604. Senecio mikanioides, usually c[illegible]. (×⅙)

sessile, semi-amplexicaul and so[illegible]urrent on the st.: heads radiate, disposed i[illegible]mpound corymbose cyme. Eu.—Closely [illegible] preceding. Not infrequent in Europe[illegible] and occasionally offered in trade catalog[illegible] same as *Ligularia macrophylla*, DC.; see [illegible] list.

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12. **Dorónicum,** Linn. LEOPARD'S BANE. A hardy herbaceous perennial, floccose-tomentulose to glabrous: lvs. thickish, ovate to lanceolate, 2–7 in. long, ½–1½ in. broad, the lower usually rather coarsely dentate and narrowed into a winged petiole, the upper much reduced, sessile and entire: heads few, large, including the bright yellow or orange-colored rays 1–2½ in. diam.; bracts of the involucre as well as the bracteoles attenuate, black-tipped: achenes striate, glabrous. S. Eu.—Frequently offered by European dealers, but seldom grown in American gardens.

3605. Senicio aureus.

13. **lùgens,** Richards. An herbaceous perennial, floccose-woolly when young but becoming nearly or quite glabrous: st. practically naked above: lvs. oblong-obovate to lanceolate, 1½–6 in. long, ½–1 in. broad, repand-denticulate, the lower narrowed into a winged petiole: heads relatively few, radiate, including the yellow rays ½–1¼ in. diam.; bracts of the involucre as well as the subtending bracteoles acute, black-tipped: achenes striate, glabrous. W. N. Amer. in the Rocky Mts. from Mont. to Alaska.—A species very little known horticulturally.

14. **exaltàtus,** Nutt. An herbaceous perennial: st. simple, erect, 8 in. to 3 ft. high, striate, glabrous, or somewhat pubescent with long flaccid jointed white hairs: lower lvs. oblong-ovate to lanceolate, including the narrowly winged petiole 3–8 in. long, ½–2 in. broad, entire to unequally dentate, glabrous or more or less crisp-hirsute; upper st.-lvs. much reduced, sessile: heads nearly ½in. high, few to many, radiate with yellow rays. Mont. to Ore., Wash. and adjacent Canada.—Little known in horticulture.

15. **saxifragoides,** Hook. f. A perennial herb from a stout rootstock: st. about 1 ft. high, branched, covered at the base with a long silky-woolly tomentum and clothed above with white hairs intermixed with purple setæ: radical lvs. petiolate, oblong-elliptic to nearly orbicular, 3–5 in. long, 1¾–4 in. broad, denticulate, appressed-villous, setose near the margin, and more or less glabrous above, hoary-woolly beneath: heads several, corymbose, radiate; rays 18–20, yellow; disk-fls. numerous: achenes glabrous. New Zeal. B.M. 8394.—Intro. into England in 1908 and brought to flower two years later at Kew; it is a strikingly beautiful plant worthy of cult.

16. **Bolánderi,** Gray. A slender herbaceous perennial: st. ascending or erect from a creeping rootstock, 6–20 in. high: radical and lower st.-lvs. undivided and crenately lobate-dentate to pinnately divided into oblong-obovate to almost rotund divisions, glabrous above, usually pubescent beneath, including the petiole 2–6 in. long, ½–1¼ in. broad: heads few, radiate, disposed in a corymbose cyme; involucre of about 13 bracts, commonly tawny-pubescent; ray-fls. 5–8, rays yellow; disk-fls. 25–40: achenes glabrous. Calif. and Ore., near the coast.

3606. Senecio Cineraria. One of the plants known as dusty miller.

17. **aûreus,** Linn. GOLDEN RAGWORT. Fig. 3605. An herbaceous perennial: sts. 1 to several from a rootstock, 1–2 ft. high, glabrous or not infrequently white-tomentulose in the lf.-axils, along the margins of the petioles, and in the infl.: lower lvs. petiolate, undivided and rotund-ovate, somewhat triangular-ovate to oblong-ovate, ½–6 in. long, two-thirds to nearly or quite as broad, crenate to doubly serrate-dentate, usually deeply cordate at the base, green on both surfaces or tinged with purple beneath, glabrous or occasionally slightly tomentulose and soon glabrate; petioles ½–10 in. long; st.-lvs. variable, petiolate to sessile and amplexicaul, lyrate to pinnatisect, reduced toward the infl. sometimes to linear entire bracts: infl. a terminal several- to many-headed corymbose cyme; heads ⅓–½in. high, radiate; involucre campanulate, calyculate, glabrous or occasionally slightly tomentulose; bracts of the involucre 13–21, linear, acute; ray-fls. 8–12, rays yellow; disk-fls. numerous: achenes glabrous. Lab. to Ga., west to N. D. and Ark. B.B. 3:544.—Frequently grown in American gardens.

3607. Senecio Cineraria—the typical form with rays.

18. **Fàberi,** Hemsl. A stout coarse herb, glabrous or glabrescent: sts. several, 4–5 ft. high, striate-angled, hollow: lvs. pinnatifid, coarsely dentate, expanding at the base into 2 large auricles partially clasping the st.; the lowermost lvs. becoming 2 ft. in length: infl. a many-headed corymbose cyme 6–8 in. diam.; heads radiate with 3–5 deep yellow rays; disk-fls. 8–12, yellow. W. China. G.C. III. 40:43, desc.—Originally intro. by Veitch & Sons, and more recently by E. H. Wilson, who has traveled in China.

19. **tanguticus,** Maxim. (*S. Hénryi,* Hemsl.). A tall stout herbaceous perennial, glabrous or nearly so: st. 6–7 ft. high, branched above, leafy: lvs. broadly ovate or deltoid in general outline, 5–7 in. long and broad, pinnately divided into lanceolate coarsely and remotely toothed divisions, dark green above, paler beneath; petioles of the lower lvs. long and dilated below into an amplexicaul base: heads very numerous, radiate, disposed in a terminal pyramidal panicle; ray-fls. 3 or 4, rays yellow; disk-fls. 3 or 4, corolla-lobes revolute. W. China. B. M. 7912. Gn. 64, p. 237.—A con-

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spicuous and attractive species; flowers in Sept. and Oct. Frequently offered by American dealers.

20. **Jacobæa,** Linn. TANSY RAGWORT. STINKING WILLIE. An erect biennial or perennial herb: st. 1–3 ft. high, leafy: basal lvs. petiolate, sublyrate; st.-lvs. sessile, 1½–6 in. long, ¾–2¾ in. broad, 2–3-pinnatisect: heads numerous, radiate with yellow rays. Eu. Naturalized in N. E. Amer. along the coast.—Occasionally cult. in gardens.

3608. Senecio Douglasii. (×⅓)

21. **uniflòrus,** All. A low herbaceous perennial, densely white-tomentose throughout: st. 2–5 in. high, usually terminated by a solitary head: lvs. mostly radical, spatulate to oblong, entire to incised-dentate, 1–2 in. long, ½in. or less broad: heads radiate; rays yellow. S. Eu.—An alpine plant, occasionally grown in Amer. and desirable for the rockery.

22. **fastigiàtus,** Nutt. An herbaceous perennial, floccose-tomentulose throughout, somewhat glabrate: st. 1–2 ft. high: lower lvs. narrowly oblong-oblanceolate, including the long slender petiole 3–6 in. long, ½in. or less broad, entire or nearly so, usually with revolute margins; upper st.-lvs. much reduced: heads radiate; commonly several in a terminal corymbose cyme; ray-fls. about 8, rays yellow. Idaho, Ore., and Wash.

23. **Pálmeri,** Gray. Suffruticose, about 3 ft. high, branching, densely white-tomentose throughout: lvs. oblong-oblanceolate, 1½–4 in. long, ¼–1 in. broad, entire to slightly sinuate-dentate, narrowed below into a more or less winged petiole: heads about ½in. high, radiate, disposed in terminal subcorymbose cymes; ray-fls. 12–18, rays yellow. Guadalupe Isl., Low. Calif.—Intro. by Franceschi, Santa Barbara.

24. **Grèyii,** Hook. f. A small spreading shrub 1½–3 ft. or more high: branchlets, under surface of lvs., and petioles densely covered with a soft white tomentum: lvs. oblong or oblong-ovate, 1½–3½ in. long, obtuse, entire, nearly glabrous on the upper surface: heads radiate, disposed in large terminal corymbose cymes; ray-fls. 12–15, rays golden yellow. New Zeal. Gn. 54, p. 434.—A hardy perennial grown in the gardens of Veitch & Son, Exeter, England.

25. **Cinerària,** DC. (*Cinerària marítima,* Linn. *Senècio acanthifòlius,* Hort.). Figs. 3606, 3607. Perennial, 2½ ft. or less tall, branching from the base, very white-woolly throughout: lvs. pinnatifid, with oblong and obtuse segms.: heads usually radiate, ¼–½in. high, disposed in small, compact cymes. F.M. 1872:52. Var. **candidíssimus,** Hort., has very white foliage. Var. **aùreo-marginàtus,** Hort., has lvs. bordered with orange-yellow.—*S. Cineraria* is an old-fashioned garden plant, sometimes known as "dusty miller," and at the present time it is much used in American gardens for ribbon-beds and margins; the commoner "dusty miller" is *Lychnis Coronaria,* and still another one is *Artemisia Stelleriana.*

26. **Douglasii,** DC. Fig. 3608. A tufted perennial, white-floccose tomentose throughout to essentially glabrous: sts. 1–3 ft. high, distinctly woody below, leafy: lvs. undivided and linear or narrowly linear-lanceolate to pinnatifid with few to several linear-attenuate divisions: infl. a terminal open corymbose cyme; heads about ½in. high, radiate; involucre campanulate, composed usually of 21 bracts subtended by numerous attenuated bracteoles; ray-fls. commonly 13, rays yellow; disk-fls. 50–70: achenes pubescent. S. Utah to Ariz., west to Calif., and northern Lower Calif.—First collected in Calif. by Douglas in 1833.

27. **magníficus,** F. Muell. A tall stout undershrub, glabrous and glaucous; st. sparingly branched, terete, leafy: lvs. thickish, sessile, oblong-lanceolate or oblanceolate, 2–6 in. long, coarsely remotely and saliently dentate: heads relatively few, radiate, disposed in terminal corymbose cymes; ray-fls. 8–12, rays golden yellow; disk-fls. numerous. Austral. B.M. 7803.—Intro. by J. H. Maiden in 1899 and brought to flower at Kew in Oct., 1900.

28. **Kirkii,** Hook. f. (*S. glastifòlius,* Hook. f. *Solidàgo arboréscens,* A. Cunn.). An erect stoutly branching shrub, 7–15 ft. high, glabrous throughout: lvs. variable, narrowly oblanceolate to oblong-obovate, 2–5 in. long, ⅓–2 in. broad, entire or sinuate-dentate, narrowed into a slender petiole or cuneate at the base: heads numerous, large, radiate, disposed in a terminal compound corymbose cyme; ray-fls. 10–12, rays ¾–1 in. long, white; disk-fls. yellow. New Zeal. B.M. 8524.—The white rays and yellow disk-fls., and the profuseness of bloom, render this species a very unusual member of its genus; it should prove an interesting plant in horticulture.

29. **grandifòlius,** Less. (*S. Ghiesbréghtii,* Regel). A leafy shrub, 3–15 ft. high: lvs. petiolate, ovate or ovate-oblong, 6–18 in. long, one-half to two-thirds as broad, acute, sinuate-dentate and remotely callous-denticulate, dark green and glabrous or nearly so above, somewhat tawny-tomentulose beneath, cordate to rounded at the base; petioles stout, 1½–5 in. long: infl. a terminal many-headed subcorymbose cyme; heads radiate; ray-fls. about 5, rays yellow; disk-fls. about 10: achenes glabrous. S. Mex. Gt. 9:296. J.H. III. 60:313.—An attractive leafy winter-flowering shrub.

30. **Prainiànus,** Berger. Shrub, about 3 ft. high: lvs. long-petiolate, ovate-deltoid, or suborbicular, 5–7 in. broad, palmately 7–9-lobed, cordate at the base, somewhat hispid above, pubescent on the prominent nerves beneath: infl. a terminal much-branched drooping panicle; heads rayless. S. Mex. G.C. III. 50, p. 82

3609. The florist's cineraria, a very large show specimen.—Supposed to have been developed from Senecio cruentus.

(whence the above description, and from which the plant would seem to be a Cacalia).—Said to be a very ornamental plant resembling the following species.

31. **Petasìtis,** DC. (*Cinerària Petasìtis,* Sims). VELVET GROUNDSEL. CALIFORNIA GERANIUM. A robust perennial 3–8 ft. high, somewhat hirsute-velutinous on the younger parts: lvs. petiolate, broadly ovate or suborbicular, 2–7 in. broad, cordate to subtruncate at the

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base, sinuately 9–13-lobed, callous-denticulate, hirtellous above, more or less grayish-tomentose beneath: infl. a terminal many-headed panicle; heads radiate, about ½in. high; ray-fls. usually 5, rays yellow; disk-fls. about 15: achenes glabrous. S. Mex. B.M. 1536. G.W. 9, p. 137.—A useful plant for winter decoration, and rather common in greenhouse cult.

32. **Heritièri,** DC. A low suffruticose perennial, seldom more than 1 ft. high: st. ascending or erect, at first white-tomentose, later glabrate: lvs. petiolate,

3610. Senecio cruentus var. Webberianus, one of the early forms of the garden cineraria.

suborbicular, ½–1¾ in. broad, 5–7-lobed, araneous-tomentulose in the young stages above but soon glabrate, densely and permanently white-tomentose beneath: heads radiate, mostly solitary on an elongated nearly naked peduncle; ray-fls. about 13, rays purple. Teneriffe. B.M. 53 (as *Cineraria lanata*). G.C. III. 50:333.—First brought into cult. about 1793.

33. **cruéntus,** DC. (*Cinerària cruénta*, Mass.). Short-stemmed perennial, floccose-woolly: lvs. large, cordate-ovate to cordate-triangular, angled or undulate and sinuate-toothed, rather long-stalked: fls. purple-red. Canary Isls. B.M. 406.—The supposed parent of the florists' cinerarias (Fig. 3609), for discussion of which see p. 771, Vol. II. According to The Garden, March 1, 1890, it was in 1777 that the type of the florists' cineraria was first intro. from the Canary Isls. by Masson. Whether the present highly improved races of cinerarias are direct descendants of *S. cruentus* or the result of hybridization is not now determined. The garden or modified race began to develop very early. Fig. 3610 is *Cineraria Webberiana*, Paxt. (*Senecio cruentus* var. *Webberianus*, Hort.), copied from The Garden, which "was raised in the spring of 1841 by Mr. Smithers, gardener to Mr. R. Williams, and has bright green leaves and boldly coloured flowers—a form that would give delight in these days." It is said that the first double cineraria is thought to have been Mrs. Thomas Lloyd, certificated in March, 1880.

Several species which have been described under the genus Senecio, some being of rather recent intro., seem to the writer to be more satisfactorily treated under the genus Ligularia. Among those appearing to be of considerable importance from a horticultural standpoint are the following: *Ligulària clivòrum*, Maxim. (Senecio clivorum, Maxim.). A robust herbaceous perennial, 4 ft. high, at first tawny-pubescent, glabrate: radical lvs. long-petiolate, reniform or subrotund, sometimes 20 in. diam., sharply mucronate-dentate: heads large, many-fld., radiate with orange-yellow rays; disk-fls. dark brown. Japan and China. G.M. 51:675. Flowers Aug. and Sept.—*Ligulària macrophýlla*, DC. (Cineraria macrophylla, Ledeb. —Senecio Ledebourii, Schz. Bip.); for description see p. 1859, Vol. IV.—*Senècio Pùrdomii*, Turrill. St. erect, sulcate, densely tawny-pubescent: radical lvs. long-petiolate, broadly orbicular, about 12 in. long, 15 in. broad: infl. paniculate; heads rayless. China. Intro. into England in 1914 by Veitch & Sons. Not yet known in American gardens. Needs further study.—*Ligulària stenocéphala*, Greenm. comb. nov. (Senecio stenocephalus, Maxim. Bull. Acad. St. Petersb. 16:218. 1871. S. cacaliæfolius var. stenocephalus, Franch.). Radical lvs. long-petiolate, reniform, about 9 in. long, 16 in. broad, deeply cordate, coarsely toothed, glabrous on both surfaces: infl. racemose, 12 in. or more long, 2¾ in. wide at the base; heads radiate; ray-fls. 1–5, rays yellow; disk-fls. 5–6. China. B.M. 8472.—*Ligulària Veitchiàna*, Greenm. comb. nov. (Senecio Veitchianus, Hemsl. G.C. III. 38:212. 1905). A very stout perennial herb with simple flowering st. 3–6 ft. high; radical lvs. 15–16 in. long, 10–11 in. broad, sharply dentate: heads very numerous, about 2½ in. diam.; ray-fls. 10–12, rays yellow. China. G.M. 50:741.—*Ligulària Wilsoniàna*, Greenm. comb. nov. (Senecio Wilsonianus, Hemsl. G.C. III. 38:212. 1905). GIANT GROUNDSEL. A robust herbaceous perennial with a flowering st. 3–5 ft. high: radical lvs. long-petiolate, the blade reniform-cordate, 10–20 in. long, 9–10 in. broad, sharply dentate: infl. an elongated columnar-like spike, branched at the base; heads very numerous, radiate, about 1 in. diam.; ray-fls. 6–8, rays yellow. China. G. 34:113. G.C. III. 42:201. This and the preceding one are desirable plants for ditch-borders and bog-gardens.

J. M. GREENMAN.

SENNA: *Cassia.* **S., Bladder:** *Colutea.*

SENSITIVE FERN: *Onoclea sensibilis.* **S. Plant:** *Mimosa pudica.*

SEQUÒIA (after Sequoyah, otherwise George Guess, a Cherokee half-breed of Georgia, about 1770–1843, originator of the Cherokee alphabet). *Pinàceæ.* BIG TREES OF CALIFORNIA. REDWOOD. Tall massive often gigantic forest trees, grown as ornamental evergreens in Europe, in California, and to a limited extent in the eastern states; of chief interest because of their great age and large size. *S. gigantea* is the most massive of all trees, although exceeded in girth by several others, notably the African baobab. *S. sempervirens* holds the record as the tallest tree in the world, at least so far as actual measurements have been made, one specimen in Humboldt County, California, measuring 340 feet, according to Sargent. Greater heights assigned to species of Eucalyptus were erroneous (see note under *E. amygdalina* var. *regnans*, Vol. II, p. 1157).

Large trees with thick red fibrous and deeply grooved bark: heartwood dark red, soft, durable, straight-grained; sapwood thin and nearly white: lvs. persistent, alternate, linear or awl-shaped or scale-like, often dimorphic: fls. monœcious; staminate catkins axillary and terminal, each of the numerous spirally arranged stamens bearing 2–5 pollen-sacs; pistillate catkins terminal, composed of many spirally arranged scales, each with 4–7 ovules at base: cone woody, persistent, the divergent scales widened at summit which is rhomboidal, wrinkled, and with a depressed center; seeds flattened; cotyledons 2.

sempérvirens, Endl. CALIFORNIA REDWOOD. Fig. 3611 (adapted from Amer. Forestry xx:323). Tree 100 to 340 ft. high, with trunk 10–25 ft. in diam. and often clear of limbs for 100 ft. in mature specimens, the narrow crown with horizontal or downward-sweeping branches: lvs. linear, mostly ½–1 in. long, 1–1¼ lines wide, spreading in flat sprays, or the upper lvs. and those on main st. of the branches often only 1–5 lines long and awl-shaped: cone oval, ¾–1⅛ in. long, ½–¾in. broad, maturing the first autumn; scales 14–26; seeds elliptic, narrowly margined, 2 lines long. Confined to northern and central Coast Ranges of Calif. on slopes exposed to sea influences. Gn. 76, p. 172. G.W. 13, p. 331; 14, p. 511.—Reproduces by seeds and by stump-sprouts, the latter numerous and remarkably persistent, often producing merchantable lumber. Var. **glauca,** Hort. Foliage with a decidedly bluish cast.

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gigantèa, DC. (*S. Wellingtònia*, Seem. *S. Washingtònia*, Sudw.). CALIFORNIA BIG TREE. Fig. 3612. Tree 150–325 ft. high, with trunk 10–30 ft. in diam.: crown pyramidal on young trees, rounded at summit or much broken in age: branches pendulous, cord-like: lvs. scale-like, ⅛–½in. long, sharp-pointed, adherent to the st. which they thickly clothe, the tip free: cone ovoid, 2–3¾ in. long, 1½–2 in. broad, opening only slightly, maturing the second summer, persistent; scales 25–45; seeds oblong or somewhat ovate, wing-margined, 2½–3 lines long. Western slopes of Sierra Nevada. C. L. A. 7:364. G.C. III. 27:374; 34:401. G.F. 10:515 (adapted in Fig. 3612). R.H. 1913, p. 55. J.H. III. 67:348. G.W. 2, p. 195; 3, p. 77; 6, p. 397; 13, p. 331. —Reproduces in nature only by seeds. As usually grown the trunk is clothed to the ground with short slender up-curved branches, making a very ornamental tree, but in mature native specimens the trunk is clear of limbs up to 80–200 ft. Var. **péndula,** Hort. WEEPING BIG TREE. A form in which the branches are strongly recurved, closely covering the st. and producing a narrow cylindric effect similar to that of Italian cypress. Originated in Eu. and prop. by grafting upon normal *S. gigantea*. G.C. III. 31:388. R.H. 1906, p. 395. Var. **glaûca,** Hort. Foliage bluish green; said to be of slow growth.

HARVEY MONROE HALL.

The sequoias.

The two great sequoias of California have a place of their own in science, history, and literature. Haenke, the botanist of the Malaspina expedition of 1791, first collected *S. sempervirens*, the coast redwood of California. Four years later Menzies, of the Vancouver expedition, secured specimens near Santa Cruz. Lambert published it in 1824 as *Taxodium sempervirens*. Douglas referred it to the same group, but in 1847 Endlicher created the separate genus Sequoia.

3611. Sequoia sempervirens. (×⅓)

Two living sequoias, *S. sempervirens* and *S. gigantea*, are all that remain of many species that flourished in Tertiary times over a large part of the northern hemisphere. More than forty fossil species have been discovered, but there is still much confusion in regard to the botany of the extinct kinds. They have been found, however, from Italy north to Spitzbergen, and across northern Asia. Several now extinct species, such as *S. angustifolia*, *S. Heerii*, and *S. Langsdorfii*, grew in California and Oregon in Miocene times. Asa Gray and others have told the story of the rise and fall of this great family of conifers, which was once as abundant as any tree-group in the world, but was cut off, swept away, destroyed by the glacial age, and survived only in parts of California. The *S. sempervirens* seems to be a descendant of the fossil *S. Langsdorfii; S. gigantea* appears related to the fossil *S. Sternbergii*. The famous petrified forest of Arizona was a species of Sequoia, according to the United States Geological Survey. These Arizonian giants which grew millions of years ago, went down under a permanent ocean, were covered with sandstone, and rose again with the present continent. In like manner vast periods of time lie between the present forests of sequoias and their ancient representatives. The value and interest of these wonderful trees are greatly increased by reason of their botanical and historical importance.

At the present time the coast redwood occupies only a narrow belt of country near the Pacific Ocean, nor is it continuous even there; the giant redwood, or California big tree, exists only in a few small and isolated groves, scattered over less than 60 square miles in all, extending along the western side of the Sierra Nevada range. Compared with the enormous territory once occupied by now extinct species of sequoia, the modern representatives of this ancient and honorable family are reduced to a very small area.

The first-known of the sequoias, and much the more valuable species, economically speaking, was *S. sempervirens*, the coast redwood of California. This is one of the most important timber trees of the world, and its forests, comparatively limited in area, have yielded and are still yielding, the most easily obtained, the most durable and profitable fencing and building lumber of the Pacific coast. The reproductive powers of the tree are enormous; no other known conifer so persistently sprouts from the stump, so rapidly makes new forests, or so well resists fire. But it does not thrive farther inland than the limits of the sea-fog, and a large part of the original area covered by this noble tree has been denuded by successive fires and destructive lumbering methods. Small redwood forests occur in Monterey County, but the most southern forests of commercial importance are in Santa Cruz. The belt, broken by the Bay of San Francisco, extends north through Marin, Sonoma, Mendocino, Humboldt, and Del Norte, and a few miles across into the southern borders of Oregon, which state contains about 400 acres of redwoods. The real redwood forests are all contained within a strip of coastlands 450 miles long and rarely more than 20 miles wide. The actual bodies of redwood within this region are merely a chain of isolated groups separated by clearings or by large areas on which redwoods never grew. A small grove, now practically destroyed, existed fifty years ago on the east side of the Bay of San Francisco, in Alameda County. Well-borers have found redwood logs in a perfect state of preservation in various parts of the Coast Range far south of where the trees now grow, even to Los Angeles and San Diego, showing that in some former period of greater rainfall and more sea-fog, redwood forests extended much farther down the coast.

The climate where the redwood thrives is comparatively equable, marked by fogs and cool summer winds from the southwest. The tree delights in rich sheltered mountain valleys and fertile slopes, in dripping fogs and in heavy winter rains. Going east from the ocean, in the redwood region, one suddenly comes to the top of a ridge, to overlook oaks and pines, and at once reaches the plainly marked edge of the *S. sempervirens* forest.

While *S. sempervirens* is sometimes called second in size among the giant conifers of the Pacific coast, the tallest tree yet authentically measured is 340 feet high, exceeding in height the tallest living tree of the Sierra

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species, and it is probable that trees exist which rise to nearly 400 feet, and therefore deserve to take first place among the conifers. Many trees of 20 and even 22 feet in diameter at 5 feet from the ground, and from 300 to 325 feet in height, are still standing in the redwood forests. The finest groves of redwoods contain many specimens that range from 150 to 250 feet or more in height and have a diameter of 12 to 18 feet. In such forests the trunks rise in clear red-brown shafts to a height of 75 to 150 feet before they branch; they stand so close that the masses of timber that exist on each acre are greater than are found in any other known forest, and through their far-distant tops the sun seldom reaches the warm sheltered soil of the Coast Range cañons. With proper management, under the principles of scientific forestry, the redwood region as it exists today could be maintained, and its future yield greatly increased, but otherwise in forty or fifty years the commercial value of the entire area will be practically destroyed.

The annual output of the redwood forests of California has steadily increased in recent years until now (1916) it approximates 25,000,000 feet, board measure (The Pioneer Lumberman statistics). Stands of 250,000 feet, board measure, to the acre are not uncommon. One tree is on record as having yielded 480,000 feet of merchantable lumber.

Nearly all of the coast redwood is in private hands, but the state of California in 1901 appropriated $250,000 to create a "redwood park" in the famous Big Basin of Santa Cruz County. Here, at the present time (1916) the state owns and cares for 3,800 acres, 1,500 of which are dense virgin forest, and much of the rest is thinly timbered. The possibilities of this superb and easily accessible park are very great. It was secured for the people by the efforts of many organizations and individuals, chief among which were the Sempervirens Club, and the late Professor Dudley of Stanford.

The Muir Grove of 295 acres is a fine forest in Redwood Cañon, Marin County, on the south side of Tamalpais, which was the gift of the Hon. William Kent to the nation. The Bohemian Club Grove on Russian River will probably remain uncut for generations. The beautiful Armstrong Woods in the same region have been offered to the state of California, but have not yet been purchased.

The *S. sempervirens*, even more than *S. gigantea*, is connected historically with many and great names. Not only Haenke, Menzies, and Douglas, but also Coulter and Hartweg aided in its introduction to Europe, where numerous horticultural varieties are in cultivation. *S. sempervirens* var. *adpressa*, Carr., is a smaller tree than the type form, with creamy white younger leaves and more glaucescent older leaves. It is called in California the "white redwood" and the "silverleaf redwood." Other horticultural varieties in cultivation are known as *S. gracilis*, *S. taxifolia*, *S. picta*, *S. albo-spica*, and *S. glauca*. The golden forms found in many other conifers occasionally appear, but cannot yet be called fixed. No really dwarf redwood is yet extant. Larger-leaved or more compact forms can be selected from the forest, and the tree responds easily to selection and culture. It thrives in gardens in the Sacramento Valley, in the Sierra foothills, and in many parts of southern California, so that its range for ornamental uses can be greatly extended on the Pacific coast. It has been largely planted in Europe, particularly in English parks, and, as was to have been expected, does best in well-drained rich soil near the ocean but sheltered from cold winds.

The most famous of the sequoias and certainly the most widely known of all living conifers is the great redwood of the Sierras, *S. gigantea*. It is undoubtedly one of the rarest of all living species of trees and one of the most easily visited and studied. It is the best living representation in the whole world of a past geologic age, and it is the most noble and impressive of trees. The interest attached to this sequoia is therefore distinctly international, and an immense body of literature has gathered about it.

Jepson, in his "Silva of California," 1910, lists thirty-one known groves of big trees in the California Sierras, containing 86,499 trees. While private owners control much of these areas, still a large part is in the National

3612. Sequoia gigantea.

Forests and Parks, where, under protection, the safety of the tree is assured and reproduction is excellent. In the Fresno grove, for example (Sierra National Forest), thousands of young trees are now growing. The low vitality of the seeds of *S. gigantea*, long a matter of complaint among nurserymen, appears to be less marked than formerly, and nearly all the groves show young trees.

The measurements of standing trees and the age-estimate made in the last decade have materially altered former conclusions. Sudworth has published an excellent table of measurements in the Calaveras Grove, and Jepson has supplemented them with measurements elsewhere. Sudworth measured thirty trees which were from 9 to 19½ feet in diameter 6 feet above the ground, and from 237 to 325 feet high. Former measurements were generally taken at the surface of the ground and hence were most misleading. A tree in Giant Forest, on the Kaweah, for example, measured (in circumference) at the surface of the ground 72 feet, but at 11 feet, where the bulge ceased, and the true shaft began, was but $57\frac{5}{12}$ feet in circumference. The famous Boole tree, in Fresno County, girths $109\frac{9}{12}$ feet at the surface, and 77 feet at 10 feet from the ground.

The problem of the age of the sequoias has long occupied the attention of students; popular literature has reveled in extravagant statements on this subject, so that many persons believe that trees now standing were in existence before the pyramids were built. As regards the coast redwood, so many trees have been cut and the rings counted that its age is now well known; this species lives from 400 to 1,300 years, or may possibly reach 1,500 years in a few cases. In respect to the Sierra redwoods, *S. gigantea*, the heavy logging done in recent years on private lands has enabled foresters to make careful age-determination. They find that mature trees range from 400 to 1,500 years. It remains to determine the resisting powers of mature trees. A few old fallen trees have been found whose rings showed ages of 2,200 to 2,300 years. John Muir estimated a partly burned tree at 4,000 years, but this is open to discussion.

The economic value of the coast redwood is so high that every principle of wise conservation requires more careful management of private forests, more complete reproduction and the reforesting of cut-over areas. Little attention has yet been paid to the by-products

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from the present waste which technical chemists are able to make profitable. This is also true of the *S. gigantea* when lumbered on private lands; the beauty and durability of the timber, and the value of its possible by-products make care in reforesting eminently desirable. Pencil manufacturers are beginning to use the wood of selected trees of *S. gigantea*. The rapidity of growth of both sequoias when young, and when favorably situated, is so great that the forestry of the future is likely to extend rather than diminish these forests.

CHARLES HOWARD SHINN.

SERÀPIAS (ancient name of an orchid, derived from Serapis, an Egyptian divinity). *Orchidàceæ*. Terrestrial herbs with the habit of Orchis: sepals connivent in the form of a helmet; petals included, small; labellum not spurred, with erect lateral lobes and a larger undivided, middle lobe; pollinia with a common viscid disk; rostellum laterally compressed.—Four or 5 species are known from the Medit. region. Keep the plants partially dry during winter months. Give plenty of water when in vigorous growth. Pot in leaf-mold, loam, and sand.

The above is the genus Serapias as formerly understood and known to horticulturists. With the recent use of this name for the Cephalanthera-Epipactis group, however, the following species are thrown in the genus Serapiastrum, taking the names *S. cordigerum*, A. A. Eaton, and *S. Lingua*, A. A. Eaton. See Vol. III, p. 1357.

Língua, Linn. St. erect, up to 1 ft. high, bearing several narrow, acute lvs.: sepals lanceolate, greenish or purplish labellum much longer; lateral lobes rounded, erect middle lobe oblong-lanceolate, acuminate, smooth, red. Medit. region. B.M. 5868, B. G.C. III. 48:482.

cordígera, Linn. Resembles the preceding species in habit: labellum brownish red, middle lobe ovate, acuminate, subcordate at the base, pilose. Medit. region. B.M. 5868, A. R.H. 1892:390. G.C. II. 20:341.

S. Helleborine, Linn., of Eu. and very local in this country, is not a horticultural subject.

HEINRICH HASSELBRING.
L. H. B.†

SERENÒA (after Sereno Watson, distinguished American botanist, 1826–1892). Also written *Serenèa*. *Palmàceæ*. Low shrubby or tree-like, more or less armed palms.

Caudex creeping, branched, clothed with the fibrous bases of the lf.-sheaths: lvs. terminal, orbicular, coriaceous, deeply plicate-multifid, glaucous beneath, with narrow bifid infolded segms.; rachis none; ligule short; petiole plano-convex, dentate on the margins: spadix long, tomentose, the flexuous rachis covered with deeply obliquely fissured, tubular sheaths, the spreading branches forked, the alternate branchlets very slender: spathes many, sheathing the peduncle: bractlets minute: fls. white: fr. ovoid, black, an inch long.—Species 2, Fla. to S. C. Cult. in the temperate house, or outdoors from Charleston southward.

The saw palmetto is the native creeping fan-leaved palm. Those who are clearing land in Florida consider it a nuisance. It is, however, of great interest to northern tourists, many of whom like to take home a small Florida palm in a pot or tub. This species does very well in pots, though it is of slow growth. Relatively speaking, it is very hardy, as it will stand a temperature of 10° F. The leaves of the saw palmetto, both fresh and dried, are sent north in great quantities for Christmas decoration. The "crowns" are also largely used for the same purpose and deserve a greater popularity. Crowns are whole tops cut off; they have no roots, and only a part of the stem. They give the effect of the whole plant and are therefore much more desirable for some purposes than single leaves. They will last for weeks, if kept moist, in the shade and free from drafts. Crowns 3 to 5 feet high are considerably used for large decorations. (E. N. Reasoner.)

serrulàta, Hook. f. SAW PALMETTO. A shrub: st. creeping, branching, 4–8 ft. long: lvs. 2–4 ft., erect, circular in outline, fan-shaped, shorter than the slender, spiny-edged petiole; segms. slightly cleft at the apex, without thread-like filaments: spadix densely tomentose, shorter than the lvs.: drupe black, ⅜–¾in. long. Summer.

arboréscens, Sarg. Tree, 30–40 ft. high, with 1 or several erect or decumbent sts.: lvs. semi-orbicular, truncate at base, yellowish green above, bluish green below, 2 x 2 ft., divided nearly to the base into narrow linear-lanceolate lobes: spadix drooping, about 3 ft. long, the fls. yellow-green. S. Fla.—Differs from foregoing in arborescent habit, more elongated spadix, much smaller fls. and smaller, globose fr. and seeds.

N. TAYLOR.†

SERICOCÁRPUS (Greek, *silken fruit*). *Compósitæ*. Five species of perennial herbs from N. E. U. S. closely allied to Aster and scarcely distinguishable from the section Biotia of that genus. The achenes are not so strongly compressed as in Aster. The fl.-heads have white rays and pale yellow disks which sometimes become purplish. They are erect perennials with alternate lvs. and medium-sized heads of white ray- and disk-fls. *S. rigidus*, Lindl., the only western representative of the group (Brit. Col. to Calif.) was once offered.

SERICÓGRAPHIS: *Jacobinia*.

SERÍSSA (from the Indian name). *Rubiàceæ*. Branched shrub, glabrous or the branches puberulent, fetid when bruised, adapted to the greenhouse: lvs. rather small, opposite, subsessile, ovate; stipules persistent: fls. rather small, axillary or terminal, solitary or fascicled, white; calyx-tube obconical, limb 4–6-parted, the lobes subulate-lanceolate; corolla funnelform, tube and throat pilose inside, limb 4–6-lobed, short, the lobes obtusely 3-lobed; stamens 4–6; ovary 2-celled: fr. subglobose.—One species, S. E. Asia.

fœtida, Lam. (*S. japónica*, Thunb.). About 2 ft. high: lvs. rather leathery, ovate, acuminate: fls. white. Japan. B.M. 361 (as *Lycium japonicum*). Var. **variegàta,** Hort., has yellow-margined lvs. F. TRACY HUBBARD.

SERJÀNIA (named in honor of Paul Serjeant). *Sapindàceæ*. Climbing or twining shrubs adapted to the warmhouse, and grown in the open in warm countries: lvs. alternate, without stipules (or with minute stipules), ternate, twice-ternate or odd-pinnate, frequently pellucid-punctate: racemes or panicles axillary, frequently bearing 2 tendrils; fls. yellowish, irregular, polygamous; sepals 5 (or 4, 2 connate), imbricate, the outer ones smaller; petals 4, the fifth seat vacant; disk undulate, swollen into 4 glands, 2 larger and 2 smaller, sometimes obsolete; stamens 8; ovary 3-celled, sessile or short-stipitate: samaræ 3, indehiscent.—About 190 species, Trop. and Subtrop. S. Amer. Probably very little cult.

cuspidàta, Cambess. (*Urvíllea ferruginea*, Lindl.). Climbing: branches acutely triangular, the angles densely brown-pilose: lvs. ternate; lfts. somewhat cordate at base, generally ovate in outline, somewhat 3-lobed, irregularly and coarsely toothed, the terminal lft. somewhat decurrent on the petiolule: fls. rather large for the genus; petals usually glabrous: fr. large, ovate, 3-winged. Brazil. B.R. 1077. Gt. 63, p. 325.

fuscifòlia, Radlk. Tall climbing rufous-pubescent shrub with costate branches: lvs. biternate, the lfts. ovate or ovate-lanceolate, acute or somewhat obtuse, simply or double serrate, more or less rufous pubescent beneath and on the nerves above, minutely pellucid-punctate, the terminal one contracted into a petiolule and the lateral ones sessile: fls. small, somewhat pedicellate, sepals tomentose: fr. ovate-elliptic, mostly puberulent or velutinous. Brazil.—Cult. in Calif.

F. TRACY HUBBARD.

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SERRADELLA is an annual leguminous plant valuable as a fodder crop on dry and sandy sterile soils. See *Ornithopus*.

SERRÁTULA (from *serra*, alluding to the roughly toothed leaf-margins). *Compósitæ*. A horticulturally unimportant group of composites consisting of about 30 species of herbaceous thistle-like perennials grown for their purple or violet fls.: sts. simple or branched: lvs. alternate, dentate, or much cut into sharp but usually unarmed segms., green both sides or sometimes pale and canescent beneath: infl. of a single pedunculate head or, as in the following, of a lax corymb; heads equal-fld., the involucral bracts in many series, narrowly acuminate at the apex, but not as in many thistles, spiny; fls. purple, but not very showy. Cult. in open border, but perhaps not in Amer. outside botanic garden collections. Eu., N. Afr., to China and Japan.

tinctòria, Linn. A much-branched, freely flowering perennial, about 2–3 ft. tall: lvs. very variable, usually deeply pinnately cleft or divided and generally lanceolate in outline; the upper sometimes undivided and petioled, the basal usually divided and nearly sessile: fls. in a dense corymbiform infl. or thin, frequently sparse and lax, purple. Cent. Eu. July and Sept.

S. atriplicifòlia, Benth. & Hook. Of vigorous growth: lvs. large, heart-shaped: heads globular, attaining height of 5 ft.: fls. purple. Cent. China.

N. TAYLOR.

SÉSAMUM (Greek name taken by Hippocrates from the Arabic). *Pedaliàceæ*. Herbs, erect or prostrate, scabrous or rarely glabrous, suitable for the warmhouse, and for the open in the S.: lowest lvs. opposite, the upper and almost all alternate, petioled, entire, incise-dentate, 3-cleft or pedately cut: fls. pale or violet, solitary in the axils; calyx rather small, 5-parted; corolla-limb 2-lipped and 5-lobed; stamens 4, didynamous; ovary 2-celled: caps. oblong or ovoid.—About 20 species, Trop. and S. Afr., E. Asia. The only species of importance is *S. indicum*, which has been extensively cult. in the tropics from ancient times. The seeds are sold in Amer. under the name of bene. They yield about half their weight of oil-of-sesame (known also as benne-, gingili-, or teel-oil), which is odorless and does not easily become rancid. This oil is universally used in India for cooking and anointing. Large quantities of oil and seed are imported from India to Eu. for the manufacture of soap and adulteration of olive-oil. Also cult. in northern states as a medicinal herb, the mucilaginous lvs. being used in dysentery and diarrhea of children. The oil of sesamum, however, which is expressed from the seeds is in large doses a laxative.

indicum, Linn. (*S. orientàle*, Linn.). Plant 1–2 ft. high: lvs. variable, 3–5 in. long, oblong or lanceolate, the lower often 3-lobed or parted: corolla pale rose or white, 1 in. long, tubular, 5-cleft, the 2 lobes of the upper lip shorter. July. Tropics. B.M. 1688.—White- and black-seeded varieties have been known for at least two centuries. Runs wild in the extreme S. WILHELM MILLER.

SESBÀNIA (from *Sesban*, the Arabian name of *S. ægyptiaca*). Syns., *Daubentònia*, *Glottìdium*. *Leguminósæ*. Herbs or shrubs, sometimes arborescent, but short-lived, suitable for the warm- and coolhouse, and for outdoor planting in the far South.

Leaves abruptly pinnate; lfts. many-paired, very entire; stipels minute or none: racemes axillary, lax; fls. yellow, red-purple, variegated, or white, slender-pedicelled; calyx broad, tube truncate, toothed or subequally lobed; standard orbiculate or ovate, spreading or reflex, wings falcate-oblong, keel incurved, obtuse or obtusely acuminate, with long claws; stamens free from the standard; ovary often stipitate: legume linear or rarely oblong, compressed, 4-angled or 4-winged.—About 30 species, widely distributed in the warmer regions of both hemispheres.

ægyptiaca, Poir. A much-branched, pale green, glabrous shrub, 5–10 ft. high: lvs. nearly sessile; lfts. 10–20 pairs, glabrous, glaucous, oblong-linear, blunt with a faint mucro: fls. bright yellow, standard round, emarginate, more or less clotted with purple: pod 6–8 in. long, distinctly torulose. July, Aug. Tropics of the Old World.—Often cult. in European gardens.

grandiflòra, Poir. A short-lived, soft-wooded tree, 20–30 ft. high: lvs. 6–12 in. long; lfts. 41–61, linear-oblong, pale green, glaucous: fls. rose-red, white, or rusty red, 2–4, in short axillary racemes; standard oval-oblong: pod 1 ft. or more long, falcate, firm, not torulose. July, Aug. Mauritius, India to N. Austral. G.Z. 29, p. 170.

punícea, Benth. (*Daubentònia punícea*, DC.). Shrub or small tree, several feet high, somewhat glaucous and glabrous: lfts. commonly 8–9 pairs, ½–¾in. long, narrowly oblong; stipules small: fls. 8–10 lines long, bright red-purple, in lax racemes; calyx truncate, teeth small; standard broadly rotundate: pod 2–4 in. long, thick, 4-angled, wings leathery, about 2 lines broad. Brazil. —Intro. into S. Calif.

Tripétii, Hort. (*Daubentònia Tripétii*, Poit. *D. Tripetiàna*, Poit.). Shrub or small tree, about 6 ft. high: lvs. pinnately compound, dull green above, glaucescent beneath: fls. orange-red, rather large, in drooping racemes; standard scarlet, much paler on the inner face, with a yellow spot on the claw; wings and keel paler. Argentina. F. TRACY HUBBARD.

SÉSELI (old Greek name for an umbelliferous plant). *Umbellíferæ*. MEADOW SAXIFRAGE. Perennial and biennial herbs in the temperate and cold regions of the Old World, of perhaps 50–60 species, sometimes mentioned in horticultural literature as acceptable border plants. Erect and branched, with lvs. decompound or 2–3-pinnate, and compound umbels of small white fls., the involucres of few or many bracts or sometimes wanting; calyx-teeth either prominent or minute; petals notched; styles very short: fr. nearly terete, ovoid or oblong. *S. Libanòtis*, Koch, of wide distribution in Eu., is perhaps most likely to appear as a cult. plant: perennial, 1–2 ft., erect and stout, glabrous or slightly pubescent: lvs. bipinnate, the lfts. ovate and sessile: umbel rounded, with many pubescent rays, and many-bracted involucres and involucels.

SESÙVIUM (derivation unknown). *Aizoàceæ*. Erect or prostrate, branched, succulent herbs or subshrubs, adapted to the warm- or coolhouse: lvs. opposite, somewhat fleshy, linear or oblong: fls. axillary, sessile or pedunculate, solitary, clustered or rarely subcorymbose, frequently flesh-colored or purple, with 2 bracts or bractless; calyx-tube turbinate, the lobes 5, oblong, obtuse, colored inside; petals none; stamens 5; ovary free: caps. oblong, membranaceous, 3–5-celled, circumscissilly dehiscent.—About 13 species, warmer temperate and tropical regions of the world, usually littoral. *S. Portulacástrum*, Linn. A diffuse procumbent or prostrate herb often wholly blood-red or purple: lvs. succulent, linear to oblanceolate or obovate-oblong, much narrowed at the base: fls. axillary, purplish or rose, peduncles equaling or shorter, rarely longer than the fls.; calyx deeply 5-lobed, the lobes ovate-lanceolate, obtuse with a mucro just below the apex behind; ovary usually 3-celled. Tropics and warmer regions of both hemispheres.—Sometimes used as a pot-herb.

SETÀRIA (Latin, *seta*, a bristle). *Gramíneæ*. Annual or sometimes perennial grasses with bristly spike-like panicles: spikelets as in Panicum, but subtended by 1 to several bristles that extend beyond the spikelet and persist after the spikelet falls: the fr., that is, the mature fertile floret, usually transversely wrinkled.—Species about 40 in the warmer regions of the world.

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Several species are annual weeds, such as YELLOW FOX-TAIL (*S. glaùca*, Beauv.) with oblong yellow spikes, and 5 or more bristles below each spikelet, and GREEN FOX-TAIL (*S. viridis*, Beauv.), with somewhat pointed green spikes and 1–3 bristles below each spikelet. Many American botanists use the name Chætochloa instead of Setaria. (Dept. Agric., Div. Agrost., Bull. 21, is devoted to this genus.) The setarias are scarcely horticultural subjects, being primarily forage plants; but they are so widespread in cult. and the forms are so confused that a somewhat full discussion of them may be inserted here.

A. *Plant perennial.*

macrostàchya, HBK. (*S. Alopecùrus*, Fisch. *S. alopecuroìdes* var. *nìgra*, of the trade). An erect or ascending perennial: spike slender, tapering at apex; bristles 1 or sometimes 2, ½–1 in. long; spikelets ⅛in. long; first glume one-third to one-half, second two-thirds to three-fourths as long as the equal sterile lemma and fr.; first glume inflated about the base of the spikelet. Texas to S. Amer.

AA. *Plants annual.*

mágna, Griseb. A coarse stout native, resembling common millet: spike ½in. thick, as much as a foot long, tapering above and below; bristles 1–3, scarcely ½in. long; spikelets ⅛in. long, elliptical; first glume one-third as long as second glume and sterile lemma, equaling the spikelet; fertile lemma smooth. Marshes of Gulf States as far north as Md.

itálica, Beauv. COMMON MILLET of the U. S. (but not of Eu., this being *Panicum miliaceum*); also called GERMAN MILLET and HUNGARIAN GRASS. Culm 3–5 ft. high: spike yellow or purple, compound, more or less glomerate; bristles 1–3, often shorter than the spikelet. Thought to have been derived from *S. viridis*. Gn. 12, p. 69.—The cult. of millet dates from prehistoric times. At present it is raised extensively in parts of Asia as a food-plant. In the U. S. millet is raised for fodder. The "Japanese millets" belong to *S. italica*, while the "Japanese barnyard millets" are *Echinochloa Crusgalli* or *E. frumentacea*.

The forms of *S. italica* may be distinguished from *S. viridis* by the articulation of the fruit (fertile floret), or what is commercially known as the seed. In the former species the fruit at maturity disarticulates above the glumes and falls away free from them. In *S. viridis* the fruit falls away surrounded by the glumes. The varieties of *S. italica* have been classified by Hubbard (Amer. Journ. Bot. 2:187.1915) as follows:

a. *Fr. yellowish to straw or light brown.* (*Stramineofructa.*)

B. *Bristles green.*

C. *Panicle more or less open-lobulate.*

Subsp. **stramineofrùcta,** Hubb. Bristles noticeably longer than spikelets: a large plant with heads 4–12 in. long, and as much as 2 in. wide, usually strongly lobed. This is one of the forms cult. as German millet. Forma **brevisèta,** Hubb. Bristles shorter than the spikelets or barely exceeding them. Cult. as Golden Wonder millet.

CC. *Panicle dense or slightly lobulate at base.*

Subvar. **germánica,** Hubb. Bristles noticeably longer than spikelets: head usually 2–3 in. long, ¼–½in. broad. One of the forms cult. as common millet.

BB. *Bristles purple.*

C. *Panicle more or less lobulate.*

Var. **Hòstii,** Hubb. Head large, lobulate, purple. Cult. as German millet.

CC. *Panicle dense or slightly lobulate at base.*

Subvar. **Métzgeri,** Hubb. Bristles noticeably longer than spikelets. Cult. as common millet, a common form. Sometimes called Hungarian grass, a name that should apply to var. *atra* (see below).

BBB. *Bristles brown.*

Var. **brunneosèta,** Hubb. Head large, lobulate, brown. Aino millet, occasionally cult. Subvar. **dénsior,** Hubb. Head compact, scarcely lobulate. Another form of Aino millet.

AA. *Fr. reddish or orange.* (*Rubrofructa.*)

Subsp. **rubrofrùcta,** Hubb. The form cult. in U. S. is var. *purpureosèta*, Hubb., with lobulate head and purple bristles. Turkestan millet. Subvar. **violàcea,** Hubb., with dense head and purple bristles. Kursk millet. Siberian millet.

AAA. *Fr. blackish, brownish black or purplish black with pale yellowish straw lines intermingled, these sometimes predominating.* (*Nigrofructa.*)

Subsp. **nigrofrùcta,** Hubb. The common form cult. in U. S. is var. *atra* with small dense heads, 1–3 in. long, with purple-brown bristles. Commonly cult. as Hungarian grass.

Many other varieties are cult. in the Old World.

A. S. HITCHCOCK.

SEVERÍNIA (named for M. A. Severino, a Neapolitan). *Rutàceæ*, tribe *Citreæ*. Small woody plants distantly related to the orange.

Spiny shrubs or small trees with short and stiff branches: spines single, at one side of the bud in the axils of the lvs.: lvs. simple, conspicuously veined, borne on short apterous petioles: fls. 5-merous, occurring 2 or 3 together in the axils of the lvs.; petals small, white; stamens 10, free; ovary 2-celled, with 1 ovule in each cell: fr. a small nearly globular berry, black when mature.—Only one species is known, usually called *Atalantia buxifolia*, native to S. China and Formosa. See Swingle, in Journ. Wash. Acad. Sci., Vol. 6, No. 19. 1916.

buxifòlia, Ten. (*Citrus buxifòlia*, Poir. *Limònia biloculàris*, Roxbg. *Scleróstylis buxifòlia*, Benth. *Atalántia buxifòlia*, Oliver). A spiny shrub or dwarf tree native to S. China, intro. into cult. in Eu. late in the 18th or early in the 19th century and often considered by botanists to belong to the genus Atalantia, from which it differs widely in the character of the fr. which is a black berry, the ovary walls becoming succulent as the fr. ripens: lvs. simple, obovate-oblong, very obtuse or emarginate, 1½ in. long, having numerous fine veins; spines solitary: fls. axillary, in fascicles or solitary, small, subsessile; stamens 10, free: fr. a true berry, becoming more or less fleshy at maturity, turning black, 2 (or sometimes 3) -celled, each cell containing a single seed, cells not filled with gum or pulp vesicles; seedlings with subterranean cotyledons, first lvs. very small, spirally arranged. Ill. Seemann, Bot. Voy. Herald, pl. 81; Penzig, Studi bot. sugli agrumi, Atl., pl. 11, figs. 6–17; Swingle in Journ. Wash. Acad. Sci., Vol. 6, No. 19. 1916.—This plant, which has lvs. resembling the box (*Buxus sempervirens*) is common in S. China and Hongkong, and occurs also in Formosa. It is grown in botanic gardens and Eu. and has been intro. in this country. It is erroneously listed by some nursery firms as *Triphasia monophylla*. It is sometimes used as a hedge-plant in La. and other Gulf states, and is well adapted for this purpose, as it does not grow to large size and has very spiny forms that can be prop. from cuttings. It is being tested by the Dept. Agric. as a stock for the cult. citrous frs., as it is able to thrive in soils too salty to permit Citrus to grow.

WALTER T. SWINGLE.

SEYMÈRIA (named in honor of Henry Seymer, an English naturalist). *Scrophulariàceæ*. Erect branched annual or perennial, mostly hardy herbs, used for bedding on account of their fls.: lvs. mostly opposite, incise-dentate or dissected, the uppermost floral ones reduced

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to entire bracts: fls. in interrupted racemes or spicate, the pedicels solitary and without bracts, yellow; calyx campanulate, with 5 narrow, entire or denticulate lobes; corolla-tube short and broad, rarely exserted, the throat broad, 5-lobed, the lobes broad or oblong, spreading; stamens, 4, subequal: caps. globose at base, the apex frequently compressed, acuminate or beaked.—Ten species, 9 from N. Amer., Texas-Mex. region and 1 from Madagascar. Seeds are sown in a well-drained bed of rather light rich soil. *S. pectinàta*, Pursh. About 1 ft. high, minutely viscid-pubescent or glabrate: lvs. pinnately parted into rather few short- or oblong-linear divisions or the upper incisely few-toothed or entire: calyx-lobes linear; corolla hairy outside. N. C. to Fla. and Ala., perhaps to Texas. *S. tenuifòlia*, Pursh. About 2–4 ft. high, very slender: lvs. copiously 1–2-pinnately parted: fls. on filiform pedicels; calyx-lobes setaceous; corolla very deeply cleft, the lobes oblong. N. C. to Fla. and Texas.

SHAD-BUSH: *Amelanchier.*

SHADDOCK. A name used in the West Indies and Florida for the forms of the pummelo, *Citrus grandis*, supposed to have been introduced from India into the West Indies sometime in the seventeenth century by a Captain Shaddock.

The shaddocks are large usually pear-shaped fruits with a thick peel and have a firm pulp of rather poor flavor. The leaves have very broad, winged petioles and the twigs are usually more or less hairy, especially when young. Shaddocks were formerly grown in Florida but have been superseded by the grapefruit (see page 1391, Vol. III) as the latter finds more favor in American markets. Pummelos, very like shaddocks, are still grown in India, China, and the East generally. See *Pummelo* (page 2857, Vol. V).

WALTER T. SWINGLE.

SHAGBARK: *Hickory.*

SHALLOT is *Allium ascalonicum*, Linn., native of Syria. It is grown chiefly for the small oblong-pointed gray bulbs (into which the parent bulb separates after harvesting in summer), which are used in cookery for flavoring; the leaves are sometimes eaten in a green state. The bulbs are of mild flavor. Shallots are little known in North America. They are grown as are garlics (see *Garlic*), the bulbs or cloves being separated and planted early in spring in any good garden soil. Each bulb produces several, all cohering by the base. The mature bulbs are 2 inches or less long and only about half that in diameter. The leaves are small, terete, and hollow. The plant is hardy. The bulbs will keep several months or even a year. Small onions are sometimes sold as shallots.

L. H. B.

SHAMROCK. Half the world is sure that shamrock is the wood-sorrel, *Oxalis Acetosella*. The other half is equally certain that the true shamrock is white clover, *Trifolium repens*. In the time of Spenser's "Faerie Queene," shamrock was said to be good to eat. This applies to the former plant, but not to the latter. Moreover, according to Sowerby, the wood-sorrel is in perfection on Saint Patrick's Day, while white clover is not. The wood-sorrel is sent in great quantities from Ireland to London for Saint Patrick's Day. On the other hand, it is said that clover is the plant most commonly used in Ireland. Half a dozen other plants have their followers, and these are all plants with three leaflets. Nevertheless there are those who deny that Saint Patrick used the shamrock as a symbol of the trinity. These declare that the water-cress is the true shamrock. The question will always remain an open one. See Dyer's "Folk-Lore of Plants."

WILHELM MILLER.

SHAMROCK, INDIAN: A name found in some English books for the *Trillium*. **S. Pea:** *Parochetus communis.*

SHEPHÉRDIA (named for John Shepherd, an English botanist). *Elæagnàceæ*. Shrubs, or small trees with scurfy scales, two of which are in cultivation, one for its striking appearance, the second for its edible fruit.

Leaves opposite, petiolate, oblong and entire: fls. small, dicœcious, in very short spikes or racemes, opposite to small bracts along the rachis, male spikes many-fld., female 2-fld. in the axils of lvs. or often sessile at leafless nodes; calyx of male fls. 4-parted, of female fls. urn-shaped, 4-cleft; stamens in male fl. 8, alternating with 8 lobes of a thick disk; ovary becoming a nut or achene and invested by the fleshy calyx, forming a drupe-like fr.—Three species, N. Amer. The genus Shepherdia was founded by Nuttall in 1818. Rafinesque's Lepargyræa, 1817, is equivalent, and the species have been placed under this name; it is not accepted under the International Rules. In *S. argentea*, the buffalo berry, the fr. is edible when made into jellies and conserves, and is much prized in the upper plains region for household uses.

The shepherdias are hardy plants, withstanding extremes of cold and drought. They are of easy culture, and grow readily from stratified seeds. For ornamental planting, they are prized for bold positions in front of shrubbery masses, where their gray or white colors afford excellent contrasts. *S. canadensis* is particularly well adapted for planting on dry rocky sterile banks, where most bushes find great difficulty in securing a foothold. *S. argentea* succeeds better in the upper Mississippi Valley than in the eastern states. Staminate and pistillate plants of it have different forms of buds.

A. *Lvs. green above.*

canadénsis, Nutt. (*Lepargyræa canadénsis*, Greene). Spreading twiggy bush 3–6 or even 8 ft. tall, the young branches brown-scurfy: lvs. ovate, oval, or elliptic, rather thick, green above but rusty beneath: fls. yellowish, in short clusters at the nodes: fr. small (¼in. or less long), oval, red or yellow, insipid. Along streams and on lake-banks, Newfoundland to Brit. Col. and in the northern tier of states, and southward in the mountains to Utah.—The yellow-fruited form has been distinguished as f. *xanthocárpa*, Rehd.

AA. *Lvs. silvery above.*

argéntea, Nutt. (*L. argéntea*, Greene). BUFFALO BERRY. Fig. 680, Vol. I. Upright shrub, or sometimes almost tree-form, reaching 18 ft. tall, thorny, the young growth silvery tomentose: lvs. oblong, cuneate-oblong or oblong-lanceolate, silvery on both sides: fls. yellowish, in dense small fascicles at the nodes: fr. globular or ovoid, about ¼in. long, red or yellow, acid, edible. Kans. to Minn., west and north. See *Buffalo Berry.*

S. rotundifòlia, Parry, from Utah, is a silvery tomentose and scurfy evergreen bush: lvs. round-oval or ovate, mostly somewhat cordate, short-petioled: fls. stalked in the axils of the lvs., the staminate mostly in 3's and the pistillate solitary: fr. globular, scurfy, ripening in July.

L. H. B.

SHERWÒODIA: *Shortia.*

SHÓRTIA (named for Dr. Charles W. Short, a botanist of Kentucky). *Diapensiàceæ*. Two acaulescent herbs, with the habit of galax.

Rootstocks creeping: lvs. evergreen, round-cordate: fl. solitary on a slender leafless scape, the calyx with scaly bracts, the corolla bell-shaped and obtusely 5-lobed; stamens 5, the filaments adnate to the corolla, alternating with 5 scale-like staminodia; pistil 3-angled and 3-loculed; style filiform and stigma 3-lobed: fr. a globular caps. From this, Schizocodon is distinguished by linear-elongated staminodia and fringed corolla. Allied genera mentioned in this Cyclopedia are Galax, Pyxidanthera, and Schizocodon. Diapensia has two alpine and boreal species, one in the Himalayas and the other in N. Eu. and N. Amer. Berneuxia, the remaining genus, has a single species in Thibet, not in the American trade. *Shortia californica* of seedsmen

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will be found under *Actinolepis*. Of the little family Diapensiaceæ, with its 6 genera and 9 species, *Shortia galacifolia* is historically the most interesting. Michaux collected the plant in 1788 in the high mountains of Carolina, but as his specimen was in fr. rather than in fl., Richard, the author of Michaux's Flora Boreali-Americana, did not describe it. Asa Gray examined Michaux's specimen, preserved in Paris, in 1839, and afterward founded the genus Shortia on it. Great search was made for the plant in the mountains of Carolina, but it was not rediscovered until 1877. The history of the efforts to find the plant is one of the most interesting chapters in American botany. For historical sketch, see Sargent, Garden and Forest, vol. 1, p. 506 (1888). Torrey & Gray founded the genus Shortia in 1842. In 1843, Siebold & Zuccarini founded the genus Schizocodon, from Japan. To this genus Maximowicz added a second Japanese species, *S. uniflorus;* the fls. of this plant, as of Shortia, were unknown when the plant was first recognized. It transpires, however, that *S. uniflorus* is really a Shortia, thus adding another instance to the growing list of bitypic genera that are endemic to Japan and E. N. Amer.

Shortia, like most plants considered rare, is really not so rare as local, though the few stations where it is

3613. Shortia galacifolia. (×½)

found abundantly do not seem to present special conditions not to be found elsewhere, and it is hardly understood why it should, in common with certain other plants, have remained strictly local, in an indigenous state. For the successful culture of shortia, humus and leaf-mold seem to be absolutely required, and it should either be planted where these conditions are natural or else be constantly supplied with this food. This suggestion, if carried out with many plants, such as galax, pyrola, chimaphila, and probably *Epigæa repens*, will ensure success, where if ordinary garden treatment only is given the entire disappearance of the plants may be expected in a season or two. Semi-double and pink-flowering plants are not rarely found, and it seems likely that cultivation may bring out several worthy varieties. In England shortia is often grown successfully as a pot-plant, and is far more appreciated than in America. It is difficult to procure seed, as the flowering-stem usually withers away before maturing, though shortia is readily propagated by division and runners. It is a shade-loving plant and is a choice addition to the ericaceous bed, where it will thrive under rhododendrons and kalmias. (Harlan P. Kelsey.)

galacifòlia, Torr. & Gray (*Sherwoòdia galacifòlia*, House). Fig. 3613. Lvs. all radical, long-petioled, the blades orbicular or broadly ovate-orbicular, often slightly cordate, at the apex obtuse or even retuse, the margin repand-serrate: peduncles slender, 3–8 in. tall, 1-fld., bracted near the top: fl. inclined or nodding, white, 1 in. across, the obtuse lobes undulate. Mountains of N. C. B.M. 7082. G.C. II. 15:596; III. 5:397; 17:453. G. 34:521; 36:121; 37:309. Gn. 38:204; 67, p. 285; 71, p. 7; 73, p. 189. J.H. III. 30:299; 58:373. G.M. 34:353. G.F. 1:509 (adapted in Fig. 3613). Gn.W. 7:605; 20:295. A.G. 12:287. Mn. 6, p. 83. C.L.A. 17:414. F.S.R. 3:8.—A very attractive plant with the look of a pyrola; very local. Var. **ròsea,** Hort., has rose-colored fls.

uniflòra, Maxim. (*Sherwoòdia uniflòra*, House). Very like *S. galacifolia:* lvs. cordate, broader than long and deeper toothed,—sinuate-toothed in *S. uniflora* and only repand-toothed in *S. galacifolia*. Japan. B.M. 8166. G.C. III. 31:337; 43:220, 221. G. 36:803. Gn. 67, p. 192; 71, p. 310; 72, p. 202. F.S.R. 3, p. 247.—Offered by importers of Japanese plants, but little known horticulturally. Var. **grandiflòra,** Hort., has larger fls. than the type, being as much as 1¾ in. across. G. 32:253. Gn. 74, p. 164; 78, p. 177. G.M. 53:205. L. H. B.

SHRUBBERY: *Planting*, Vol. V.

SHÙRIA: *Scheeria*.

SIBBÁLDIA (named for Robert Sibbald, Scotch naturalist). *Rosàceæ*. Low and depressed perennials, hardy and rare in cult., sometimes used in alpine-gardening: lvs. 3-foliate, alternate; stipules prominent: fls. cymose, yellow, small; calyx flattish, 5-cleft and with 5 bractlets; petals 5, linear-oblong, minute; stamens 5, alternate with the petals: achenes 5–10.—About 5 species, natives of the colder parts of the North Temperate Zone. Reduced by Bentham and Hooker to a section of Potentilla, but separated by most authorities.

procúmbens, Linn. Lfts. 3, wedge-shaped, 3-toothed at the apex: petals yellow. Ranges from the arctic regions to the summits of the White Mts. and in the Rockies comes as far south as Utah. It is also found in arctic and alpine Eu. and Asia. B.B. 2:217.—This plant is recommended by some persons, but is not known to be advertised for sale in Amer.

F. Tracy Hubbard.†

SIBIRÆA (named for the habitat of the plant, Siberia). *Rosàceæ*, subfam. *Spiræeæ*. Two shrubs from N. E. Asia and W. China closely allied to Spiræa, but differing in the narrow entire lvs., the polygamo-dicœcious fls. disposed in panicled racemes and in the 2-seeded carpels connate at the base. *S. lævigata* is a deciduous upright shrub with rather stout branches, with alternate, entire, generally oblong lvs. and with small short-stalked white fls. in spike-like racemes crowded into terminal panicles. It possesses no particular ornamental qualities and is rarely cult.: hardy N. The hardiness of the recently intro. *S. tomentosa* has not been sufficiently tested. Prop. is by seeds sown in spring or by layers. **S. lævigàta,** Maxim. (*S. altaiénsis*, Schneid. *Spiræa lævigàta*, Linn.). Shrub, 5 ft. high, with stout upright branches: lvs. cuneate-oblong, bluish green, glabrous, 1½–3½ in. long: fls. polygamous, greenish white, in terminal panicles, 3–5 in. long, those of the staminate plant somewhat showier. May. Siberia. G.O.H. 89. Var. **angustàta,** Rehd. Lvs. narrow-lanceolate, 1–4 in. long and rarely more than ½in. broad: infl. pubescent. W. China. Var. **croàtica,** Schneid., from S. E. Eu., is similar to the preceding variety, but the lvs. are obtuse and the infl. not pubescent. It is not yet intro. **S. tomentòsa,** Diels. Low shrub, to 2 ft.: lvs. oblong-obovate to oblanceolate, acutish and mucronulate, with silky silvery white tomentum beneath while young, glabrous above, 2–3 in. long: fls. greenish yellow in dense panicles about 2 in. long. S. W. China. Alfred Rehder.

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SIBTHÓRPIA (named in honor of John Sibthorp, 1758–1796). *Scrophulariàceæ*. Hardy or greenhouse perennial herbs, often rooting at the nodes, grown mostly for the flowers.

Leaves alternate or fascicled, petioled, orbiculate-reniform, coarse-crenate or incise-pinnatifid: pedicels axillary, solitary or fascicled: fls. yellow, yellowish rose or red; calyx campanulate, 4–8-cleft, the lobes slightly unequal; corolla-tube short or very short, rotate, limb spreading; anthers sagittate: caps. membranaceous, compressed, loculicidally dehiscent, the valves splitting to the middle.—About 7 species, E. Eu., Trop. and N. Afr., mountains of India and S. Amer.

europæa, Linn. A hardy trailing perennial with very slender sts.: lvs. orbicular, less than ½in. across, 7–9-lobed: fls. small, on rather short pedicels, the 2 upper lobes of the corolla yellowish, the 3 lower pink. Deep woods, Eu. Var. **variegàta,** Hort., a form with bright golden green foliage, is cult. abroad.

peregrìna, Linn. Tender trailing greenhouse perennial: lvs. much crenated: peduncles frequently fascicled, 2 in. long: fls. yellow, 5–8-parted; stamens slightly shorter than the corolla. June. Mauritius. B.M. 218 (as *Disandra prostrata*). F. TRACY HUBBARD.

SICÀNA (Peruvian name). *Cucurbitàceæ*. Annual slender subglabrous tall-climbing vines, used out-of-doors in the S. for ornament: lvs. palmately 5–9-lobed, very glabrous and shiny; tendrils 3–5-cleft, the branches adhering at the tip: fls. rather large, yellow, monœcious, all solitary; calyx-tube short-campanulate, 5-lobed, the lobes ovate-lanceolate, recurved; corolla inflated-campanulate, 5-lobed above the middle, the lobes broad-ovate; stamens 3 in the male fl.: fr. large, fleshy, many-seeded, fragrant and edible.—Three species, Trop. Amer. Allied to Cucurbita, but differing in having wide-spreading or reflexed calyx-lobes and the anthers not united.

odorìfera, Naudin, the CURUBA and PEPINO ANGOLO of the tropics, has been intro. in the U. S. as the CASSABANANA. Fig. 3614. It is a very quick-growing and interesting ornamental vine: plant glabrous, the sts. angled: lvs. large (often 1 ft. across), nearly orbicular in outline, deeply cordate at the base, strongly about 5-lobed and the lobes repand-toothed or angled: fls. solitary, monœcious, the corolla small and yellowish, urn-shaped, with small reflexed lobes; stigmas 3, each 2-lobed: fr. like a slender vegetable marrow, 1–2 ft. long, smooth, nearly cylindrical, orange-crimson, with a very strong aromatic odor. R.H. 1890:516.—Probably native to Brazil, but occurring also in Mex. and the W. Indies. The curuba seems to be grown in the tropics as an ornamental plant, although it is said to afford edible preserves. The plant climbs 30–50 ft. It is well worth growing on summer arbors, or under glass if one has room for it. The frs. are very interesting, fragrant, and ornamental. Perennial.

S. atropurpùrea, André. Has shorter subpyriform, brilliant violet-purple frs., and purple-tinted under surfaces of the lvs. Perhaps a form of S. odorifera. Uruguay. R.H. 1894:108.—*S. sphérica,* Hook. f. Fls. large and spreading, more like those of Cucurbita: lvs. reniform, 3–5-lobed: fr. globose, size of a small orange. Jamaica. B.M. 7109. L. H. B.

SÍCYOS (Greek name for the cucumber). *Cucurbitàceæ*. Climbing or prostrate annual herbs useful for ornamental purposes, one especially for covering walls and the like: lvs. membranaceous, angulate or lobed, rarely deeply 3–5-lobed; tendrils 3-cleft: fls. small or minute, whitish, monœcious, the sterile and fertile mostly from the same axis, the former corymbed, the latter in a capitate cluster, long-peduncled; petals 5, united below into a bell-shaped or flattish corolla; ovary 1-celled: fr. ovoid, dry, and indehiscent, 1-seeded.—About 50 species, warmer parts of N. and S. Amer., Pacific islands, and Austral.

angulàtus, Linn. BUR CUCUMBER. Annual climbing herb: lvs. very broadly rhombic-ovate, more or less shallow, 5-angled or lobed, palmately veined; the lobes rather broad-deltoid, the midlobe abruptly and narrowly acuminate, the lateral lobes apiculate, base somewhat halberd-shaped with a rounded rather narrow sinus; the petiole slender and glandular-pilose. S. Maine and W. Que. to Fla. and west to Minn., E. Kans., and Texas.—Used on account of its rapid growth for screening walls, lattice-work, and the like.

SÌDA (from the old Greek name for *Nymphæa alba;* given without explanation by Linnæus). *Malvàceæ*. Herbs or shrubs with the indumentum frequently soft or tomentose, adapted to the warm- or coolhouse or some of them hardy; one species, *S. rhombifolia,* now cultivated in India for its fiber.

Leaves simple or lobed, usually serrate or dentate: fls. sessile or pedunculate, solitary or glomerate, axillary or in terminal racemose spikes or heads, various-colored and sometimes showy, often small, yellow or whitish; calyx 5-toothed or 5-cleft; staminal column divided at the top into numerous filaments: carpels 5 or more, when ripe separating from the axis, generally 2-awned at the summit; seed 1 to a carpel and pendulous.—About 120 species, widely distributed in Afr., Asia, Austral., and N. and S. Amer.

3614. Sicana odorifera, the cassabanana. (×¼)

A. *Lf.-blades palmately lobed: fls. white.*

hermaphrodìta, Rusby (*S. Napæa,* Cav. *Napæa hermaphrodìta,* Linn.). A hardy herbaceous perennial 5–8 ft. high, from a stout root: lvs. 3–8 in. long, 3–7-lobed; lobes triangular, long-acuminate, irregularly serrate: fls. perfect, white, about 1 in. across, in terminal corymbose panicles. June–Aug. S. Pa., W. Va., and Va. B.B. 2:422.—Cult. same as for hollyhocks; prop. by seed. Index Kewensis refers the above species to *Napæa dioica,* Linn., but according to Gray's Synoptical Flora of North America the two species belong to separate genera, the fls. of the first being hermaphrodite, of the second dicœcious. *Napæa dioìca* is a strong-growing perennial 5–9 ft. high, with large radical lvs. often 1 ft. across and 9–11-cleft, the segms. cut into lanceolate serrate lobes: fls. dicœcious, white, smaller than in *Sida Napæa.* For pictures of the two plants, see B.B. 2:420, 422.

AA. *Lf.-blades merely toothed: fls. of various colors.*

B. *Lvs. ovate to cuneate or lanceolate.*

rhombifòlia, Linn. Shrubby or subshrubby: lvs. very variable, rhomboid-lanceolate to lanceolate, lower surface usually paler or even hoary: fls. axillary, solitary, pale yellow, rarely white, the petals blotched with red at the base. Tropics and subtropics of both hemispheres.—Yields a good fiber, and its cult. for this purpose has recently been encouraged in India. Probably of little value for ornament.

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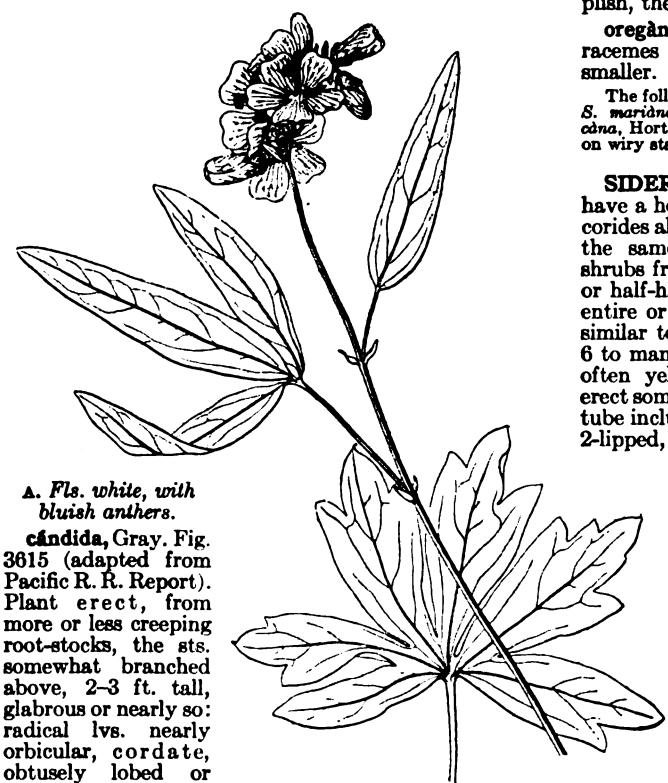
BB. *Lvs. linear or linear-oblong.*

Élliottii, Torr. & Gray. A hardy perennial herb, slender, 1–3 ft. high, with lvs. 1 in. long and yellow fls. Sandy soil in the southern coast states. Offered by western collectors in 1881. B.B. (ed. 2) 2:520.

F. TRACY HUBBARD.†

SIDÁLCEA (compound of *Sida* and *Alcea*, related genera). *Malvàceæ.* Some of the sidalceas are annuals, but those in cultivation are hardy perennials, being recommended for the herbaceous border.

Leaves palmately cleft or parted, stipular: fls. often showy, pink, purple, or white, in terminal racemes or spikes, mostly without bracts or involucels beneath; stamens united into groups in a double series: carpels 5–9, reniform, separating at maturity.—About 30 species, natives of W. N. Amer. For monograph, see Gray, Syn. Fl. N. Amer., vol. 1, p. 302. Of easy cult. Prop. by seeds or division.



3615. Sidalcea candida. (×½)

A. *Fls. white, with bluish anthers.*

cándida, Gray. Fig. 3615 (adapted from Pacific R. R. Report). Plant erect, from more or less creeping root-stocks, the sts. somewhat branched above, 2–3 ft. tall, glabrous or nearly so: radical lvs. nearly orbicular, cordate, obtusely lobed or deeply crenate; st.-lvs. 5–7-parted, the divisions narrow and often notched: fls. 1 in. or more across, white, in an erect spike-like raceme. Rocky Mts. Gn. 24, p. 396; 28, p. 29. G.M. 49:316. Gn.W. 24:299 (as *S. malvæflora*). J.H. III. 56:451. R.H. 1891, p. 356.

AA. *Fls. normally colored (rarely white forms).*

B. *Mature carpels smooth (not reticulated).*

spicàta, Greene (*S. Murrayàna*, Hort.). One or 2 ft. tall, sparingly branched or simple, often more or less hirsute: upper lvs. parted into linear and often lobed divisions: fls. rather small, purplish, in an oblong, more or less interrupted spike, the pedicels short or almost none. Calif., Nev., and Ore.

BB. *Mature carpels conspicuously reticulated.*

malvæflòra, Gray. Sts. erect or ascending, 1–6 ft. or even more, sparingly hirsute: lvs. green, small, incised-crenate, the upper ones 5-cleft or 5-divided, segms. narrow and entire or broader and pinnate-lobed: fls. 2 in. or less across when fully expanded, purple. Calif. H.U. 2, p. 65 (as *Nuttallia malvæflora*). Var. **atropurpùrea,** Hort. (*S. atropurpùrea*, Hort.), grows 2–3 ft. high, with large, open, purple fls. Var. **Lísteri,** Hort. (*S. Lísteri*, Hort.), known also as "pink beauty," has satiny pink fls. It is of European origin.

neo-mexicàna, Gray. One to 8 ft. high: sts. hirsute-pubescent, more or less branched: radical lvs. orbicular, 5–9-lobed or incisely crenate; cauline lvs. parted, segms. 3-lobed: raceme many-fld.: fls. rose; calyx hirsute: carpels smooth and glabrous. Mountains of New Mex. and Ariz. northward to Wyo.

campéstris, Greene. Two to 5 ft., often branching above, glabrous or sparingly hirsute-pubescent: lvs. green, the lower ones rounded and variously lobed, the upper ones 5–7-parted into narrow divisions: fls. about 1½ in. across, in strict spike-like racemes, purplish, the petals often laciniate. N. Calif. to Brit. Col.

oregàna, Gray. Less hairy than *S. campestris*, the racemes becoming branched and paniculate: fls. smaller. Ore. and Wash.

The following are offered in the trade, but unknown botanically: *S. maridna*, Hort., growing 3 ft. high: fls. bright pink.—*S. mexicàna*, Hort., a strong grower, 3 ft. high, with satiny rose fls. borne on wiry sts.

F. TRACY HUBBARD.†

SIDERÌTIS (Greek, *iron;* the plants were supposed to have a healing power for wounds caused by iron. Dioscorides also used the name for other plants credited with the same ability). *Labiàtæ.* Herbs, subshrubs, or shrubs frequently lanate or softly pilose, mostly hardy or half-hardy but some of them coolhouse plants: lvs. entire or toothed, the floral ones reduced to bracts or similar to the lower cauline: fls. in axillary clusters of 6 to many fls. or in interrupted or dense spikes, small, often yellowish; calyx tubular, 5–10-nerved, with 5 erect somewhat spiny teeth, or rarely muticous; corolla-tube included, bare or with a pilose ring inside, the limb 2-lipped, the posterior somewhat flat, entire, emarginate or 2-cleft, the anterior spreading, 3-cleft; stamens 4, didynamous: nutlets ovoid, smooth, obtuse, not truncate at the top.—About 60 species, Medit. region, Canary Isls., and the Orient. Probably the commonest is *S. scordioìdes*, Linn., a hardy subshrub, about 1 ft. high, with ovate, oblong, or oblong-linear, incised-toothed lvs., spikes which are 1–3 in. long of yellowish fls. with the upper lip of the corolla paler or white. S. Eu. Variable.

Other species which have been mentioned are: *S. canariénsis*, Linn. A greenhouse shrub several feet high, with ovate, crenate lvs. which are cordate at the base, and subglobose whorls of 20–30 fls. Canary Isls.—*S. cándicans*, Ait. A greenhouse shrub about 3 ft. high, covered with white wool, with ovate lvs. which are truncately cordate at the base, whorls of about 10 subsessile fls., the lower ones distant. Madeira and Canary Isls.—*S. incàna*, Linn. A half-hardy subshrub about 1 ft. high, with white-woolly branches, sessile, oblong-linear, obtuse, white-woolly lvs. and distant whorls of about 6 fls. Spain.—*S. perfoliàta*, Linn. A half-hardy subshrub about 1–1½ ft. high, with half-clasping, ovate-oblong or lanceolate softly villous lvs. and distant whorls of sessile fls. S. Eu.—*S. taùrica*, Willd., is a half-hardy shrub about 1½ ft. high with thick oblong-lanceolate or spatulate lvs., the lower ones crenulate, densely white-woolly. Caucasus region and Asia Minor.

F. TRACY HUBBARD.

SIDERÓXYLON (Greek, *iron* and *wood*, referring to the hardness of the wood). *Sapotàceæ.* Trees and shrubs, with simple lvs. and small fls. in axillary clusters: fls. 5-merous or rarely 6-merous; calyx-lobes roundish or ovate, usually obtuse, nearly equal; corolla more or less bell-shaped; stamens attached to the tube at the base of the lobes and opposite to them; staminodia scale-like or petaloid; ovary usually 5-loculed: berry ovoid or globose.—About 110 species, mainly tropical, a few extra-tropical. S. Afr., Austral., and New Zeal.

Mastichodéndron, Jacq. Tree, to about 50 ft., with somewhat variable lvs. usually oval or ovate-oblong, 2–8

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in. long, and small yellow fls.: fr. about ¾in. through. W. Indies; cult. in S. Calif.—Said to yield a sort of chewing-gum. Wood useful in furniture-making.

F. W. BARCLAY.

SIEVEKÍNGIA (named for Dr. Sieveking). *Orchidàceæ*. Pseudobulbous orchids suitable for the warmhouse; of secondary importance.

Pseudobulbs usually clustered, 1-lvd.: lf. usually petioled: labellum immobile, angled with the column, ventricose, either simple or tridentate at the apex.—About 3 species, natives of Cent. and S. Amer. Allied to Lacæna.

Reichenbachiàna, Hook. f. Pseudobulbs clustered, 1 in. long, ovoid or obpyriform, blotched with blood-red when old: lf. single, 4–5 in. long, petioled, elliptic-lanceolate, acuminate at both ends, dark green, strongly 5-ribbed: fls. about 6 in a pendulous corymb, about 1¼ in. across; sepals subequal, ovate, pale straw-colored; petals linear, acute, golden yellow, they and the lip margined with long flexuous golden hairs; lip spread out, side lobes large, dimidiate-ovate, subfalcate, golden yellow, blotched with blood-red, midlobe small, linear, lacerate. Ecuador. B.M. 7576.

suàvis, Reichb. f. Pseudobulbs pyriform, approximate: lf. petioled, cuneate-oblong, acute, plicate: fls. about 3 in a pendulous raceme; sepals greenish yellow, ovate; petals and lip deep yellow, the latter with a few minute blackish dots inside and some larger ones on the basal crest. Costa Rica.

There is a third species in the trade, *S. peruviàna*, Rolfe, but while mentioned in Orchid Review it seems never to have been described. A native of Peru.

F. TRACY HUBBARD.

SIGMATÓGYNE (Greek *S* and *female*, referring to the S-shaped gynostemium, the peculiar column of the orchids). *Orchidàceæ*. Epiphytic herbs with perennial 2-lvd., small pseudobulbs: lvs. perennial, membranaceous: scape various-fld.(?), rising below the pseudobulb, 1-fld.: fls. perfect, small, diaphanous; perianth spreading, upside down, withering; sepals 3, free, the dorsal keeled, the lateral almost straight forward and symmetrical; petals 2, rather similar to the sepals; labellum free, inserted at the base of the S-bent rather broad gynostemium, somewhat mobile; column broad, thick, much shorter than the labellum; pollinia 4, in pairs; rostellum (beak) little bent down: caps. unknown. Two species, Himalayas. *S. Pantlingii*, Pfitz. Plant small: scape scarcely exceeding the narrowly ovate pseudobulbs: sepals scarcely ⅜in. long, oblong, the dorsal carinate, acute, the lateral concave at base; petals similar, narrower; labellum entire, oblong, slightly dilated toward the apex. Assam.—The color of the fl. is not described and the scape including the fl. is only about 1¼ in. long.

F. TRACY HUBBARD.

SIGMATÓSTALIX (Greek *S* and *stake*). *Orchidàceæ*. Low herbs with very short, few-lvd. sts., covered with distichous sheaths and terminated by a 1-lvd. pseudobulb, suitable for the warmhouse: fls. in racemes, short-pedicelled, pendulous, medium-sized or small; sepals free, about equal, spreading, acute or acuminate; petals similar to the sepals only narrower; labellum long-clawed, 2-keeled; column elongated, very narrow; pollinia 2: caps. ovoid, 3-edged, beakless.—About 12 species, Trop. Amer. *S. bicornùta*, Rolfe. Cespitose, about 2 in. high: pseudobulbs elliptic-oblong, apex 1-lvd., base 4-lvd.: lvs. linear, subobtuse or minutely denticulate: scapes lateral, slender, few-fld.: fls. small, yellow with deep purple-red stripes; sepals linear-lanceolate, reflexed; petals linear-lanceolate, with 2 fleshy conical horns; labellum sessile, somewhat spreading, reniform-orbicular. Peru. *S. Élixe*, Rolfe. Pseudobulbs compressed, ovate-oblong, apex 1-lvd., base 2–3-lvd.: lvs. oblong and very short bidentate, base attenuate: scapes slender, many-fld.: fls. yellow, spotted with red-dish brown; sepals and petals oblong-lanceolate, acute, reflexed; labellum spreading, broad-clawed, 3-lobed, midlobe reniform-orbicular, lateral lobes reflexed, linear-oblong. Colombia. *S. peruviàna*, Rolfe. Cespitose, about 2–3 in. high: pseudobulb ovoid or ovoid-oblong, apex 1-lvd., base 4-lvd.: lvs. linear, subobtuse, or minutely denticulate, base conduplicate: scapes lateral, slender, few-fld.: sepals and petals straw-colored with purple band at base of dorsal sepal and the petals, lip light yellow with a shiny orange-yellow crest; sepals oblong spreading; petals suberect, oblong; labellum subsessile, deltoid-reniform, undulate. Peru.

F. TRACY HUBBARD.

SILÈNE (Greek name of one of Bacchus' companions described as covered with foam, also connected with *sialon*, saliva; referring to the stickiness of the stem and calyx of some species). Including *Heliospérma* and *Melándrium* in part. *Caryophyllàceæ*. CATCHFLY. CAMPION. Erect, cespitose, decumbent or diffusely climbing annual, biennial, or perennial herbs, some of them tender and grown in the greenhouse, others hardy and planted outdoors for their ornamental effect; often excellent plants for the rock-garden.

Leaves opposite, entire: fls. solitary or variously cymose, white, through pink to rose and purple; calyx 5-toothed, 10- to many-nerved, naked at the base; petals mostly crowned with a scale at the base of the blade; stamens 10; styles 3, rarely 4: pod 1-celled, sometimes 3-celled.—Over 400 species described, widely scattered over the world. There is a monograph of Silene, with a key, in the Journal of the Linnæan Society, vol. 32 (1896), by F. N. Williams, with 390 good species. Williams refers the common *S. virginica* and *S. pennsylvanica* as well as the European *S. viscosa* to the genus Melandrium, characterized by a strictly unicellular caps. with no trace of septation at the base. Only a few of the known species are in cult.

Silenes are of easy culture. They mostly bloom in summer, and a few continue well into autumn. By good management the season of bloom may be continued through spring and summer. Toward this end the seeds of the common annual kinds should be sown in early autumn, instead of spring. As a rule, the common kinds prefer a sandy loam and full sunlight, but the rock-garden kinds require special treatment, and other suggestions for cultivation are given after the specific descriptions. The most popular kinds are the pink and rose annuals, *S. Armeria* and *S. pendula*. Of the perennials the most popular among the white-fld. kinds are *S. maritima* and *S. alpestris*, while *S. virginica*, *S. pennsylvanica* and *S. Schafta* are amongst the most popular kinds with colored flowers. A good horticultural review of the kinds in cultivation is found in The Garden, vol. 11, pp. 10–13 (1877).

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KEY TO THE SPECIES.

A. *Duration annual or biennial.*
B. *Plants glabrous, although viscid above in No. 1.*
C. *All except the lowest lvs. ovate or ovate-lanceolate from a subcordate, clasping base* ..... 1. **Armeria**
CC. *All except the lowest lvs. oblong or oblong-lanceolate from a connate base* ..... 2. **compacta**
BB. *Plants pubescent or tomentose.*
C. *Sts. simple* ..... 3. **viscosa**
CC. *Sts. dichotomously branched, at least above.*
D. *Fls. sessile, white* ..... 4. **dichotoma**
DD. *Fls. pedicelled, finally pendulous, usually flesh-colored to purple but white in one variety.* 5. **pendula**
AA. *Duration perennial.*
B. *Height 1 ft. or more (Nos. 8, 12, 17, and 18 are usually less than 1 ft.; No. 9 is placed here with uncertainty as its height is not definitely stated).*
C. *Nerves of the calyx 20.*
D. *Sts. erect: base of lvs. cordate...* 6. **fimbriata**
DD. *Sts. procumbent or ascending: base of lvs. narrowed.*
E. *Fls. several to a st.: sts. ascending* ..... 7. **latifolia**
EE. *Fls. 1 or few to a st.: sts. procumbent* ..... 8. **maritima**
CC. *Nerves of the calyx 10.*
D. *Plants glabrous.*
E. *Lvs. linear-oblong* ..... 9. **tatarica**
EE. *Lvs. lanceolate-spatulate*.....10. **Asterias**
DD. *Plants pubescent or at least puberulent or pruinose-scabrous.*
E. *The lvs. in whorls of 4 (the uppermost and lowest sometimes opposite)*.....11. **stellata**
EE. *The lvs. not in whorls of 4.*
F. *Blades linear or narrowly lanceolate or oblanceolate.*
G. *Sts. more or less decumbent or geniculate at the base.*
H. *Fls. solitary on the peduncles*.....12. **multicaulis**
HH. *Fls. mostly in 3-fld. cymes.*
I. *Calyx oblong or obovate: fls. white or pink*.....13. **Douglasii**
II. *Calyx long-cylindrical, pink, green-nerved: fls. bright carmine*.....14. **laciniata**
GG. *Sts. erect.*
H. *Fls. erect*.....15. **Fortunei**
HH. *Fls. nodding*.....16. **Scouleri**
FF. *Blades broader, usually ovate or obovate, sometimes broadly lanceolate or oblanceolate.*
G. *Sts. more or less decumbent or procumbent.*
H. *Infl. leafy and borne in the forks of the branches*.....17. **Menziesii**
HH. *Infl. not leafy, usually at least partly terminal.*
I. *Petals obcordate: fls. rose*.....18. **rosiflora**
II. *Petals 4-cleft or 4-lobed: fls. scarlet*..19. **californica**
GG. *Sts. erect, usually stout..*
H. *Fls. crimson or scarlet.*
I. *Lvs. thin, spatulate or oblanceolate; apex blunt or abruptly acute*.....20. **virginica**
II. *Lvs. thick, ovate-lanceolate; apex acute or acuminate*....21. **regia**
HH. *Fls. white, greenish white, or bright green.*
I. *The fls. erect: lvs. tomentose*.....22. **gigantea**
II. *The fls. nodding: lvs. pubescent but not tomentose.*
J. *Base of calyx gradually attenuate to the pedicel*..23. **viridiflora**
JJ. *Base of calyx truncate and umbilicate*.....24. **mellifera**
BB. *Height 2–10 in. (Nos. 8, 12, and 18 occasionally reach 1 ft.; No. 17 is often 1 ft. or more high; No. 9 may belong here but is probably taller than 1 ft.).*
C. *Nerves of the calyx 20.*
D. *Plant not cespitose*.....25. **Zawadskii**
DD. *Plant cespitose.*
E. *Lvs. linear: plant dwarf, 2–4 in. high*.....26. **pumilio**
EE. *Lvs. lanceolate or ovate-lanceolate: plant 8–16 in. high*.. 8. **maritima**
CC. *Nerves of the calyx 10.*
D. *Blades linear or narrowly lanceolate (the lowest lvs. of No. 30 are somewhat spatulate, the others linear).*
E. *Species strictly glabrous.*
F. *Peduncles 5–11-fld*.....27. **Lerchenfeldi-**
FF. *Peduncles 1-, rarely 2-fld*.. **[ana**
G. *Sts. lacking or almost so: plants not more than 2 in. high*.....28. **acaulis**
GG. *Sts. present: plants 4–6 in. high*.....29. **dianthifolia**
EE. *Species more or less pubescent or at least viscid above.*
F. *Petals 4-lobed.*
G. *Fls. solitary or in 3's*...30. **quadrifida**
GG. *Fls. in panicles.*
H. *Color of fls. white*.....31. **alpestris**
HH. *Color of fls. cardinal-red*.....14. **laciniata var. [Purpusii**
FF. *Petals 2-lobed or 2-cleft.*
G. *Calyx glabrous.*
H. *Claws of the petals dilated and glabrous; calyx-teeth alternately oblong, obtuse and lanceolate, acute*....12. **multicaulis**
HH. *Claws of the petals ciliate; calyx-teeth ovate, obtuse*.....32. **Saxifraga**
GG. *Calyx pubescent.*
H. *Tube of calyx campanulate*.....33. **odontopetala**
HH. *Tube of calyx clavate or tubular becoming oval.*
I. *Fls. rose*.....34. **Elizabethæ**
II. *Fls. white.*
J. *Infl. cymose, few-fld*.....35. **ciliata**
JJ. *Infl. racemose-paniculate.*
K. *Fls. erect*.....36. **repens**
KK. *Fls. nodding*...37. **Reichen-**
DD. *Blades broader, when lanceolate, relatively broad as compared with the length.* **[bachii**
E. *Plant glabrous*.....38. **rupestris**
EE. *Plant pubescent or at least velvety.*
F. *Lvs. lanceolate, oblong-lanceolate, or ovate-lanceolate, blade broadest at or below the middle.*
G. *Fls. white.*
H. *Infl. leafy, borne in the forks of the branches*.....17. **Menziesii**
HH. *Infl. terminal on a st. ascending from below the rosette*.....39. **caucasica**

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GG. *Fls. rose or rose-purple.*..18. **rosiflora**
FF. *Lvs. obovate or more or less spatulate, at least the lower, blade broadest above the middle.*
G. *Claw of petal ciliate.*
H. *Petals bifid*.....40. **vallesia**
HH. *Petals 4-cleft*.....41. **Hookeri**
GG. *Claw of petal glabrous.*
H. *Apex of petal 4-toothed*.....42. **pusilla**
HH. *Apex of petal 2-lobed or notched.*
I. *Calyx long-cylindrical: fls. 1–5, axillary and terminal, solitary*.....43. **Schafta**
II. *Calyx clavate: fls. in small dense terminal cymes*.....44. **pennsylvanica**

1. **Armèria,** Linn. SWEET WILLIAM CATCHFLY. Fig. 3616. Annual, glabrous, viscid above: sts. 1–1½ ft. high, erect, simple or slightly branched: lowest lvs. spatulate, the others ovate or ovate-lanceolate, from a subcordate, clasping base: fls. pink or rose, in dense cymes, corymb-like, often dichotomous; calyx 10-nerved, cylindrical, clavate in fr.; petals obovate-cuneate, subretuse: caps. oblong. July–Sept. S. Eu. B.B. (ed. 2) 2:66. Var. **álba,** Hort., is a white-fld. form.

2. **compácta,** Fisch. Biennial, glabrous, glaucescent: sts. about 1½ ft. high, stout, simple or slightly short-branched above: lowest lvs. spatulate-lanceolate, the others oblong or oblong-lanceolate from a connate base: fls. pink, crowded in dense, sessile heads, with the uppermost lvs. involucrate; calyx clavate; petals obovate, entire: caps. oblong. July. E. Eu., Asia Minor. L.B.C. 17:1638.—Most of the material cult. under this name is *S. pendula* var. *compacta*.

3. **viscòsa,** Pers. Biennial, somewhat tomentose, very viscid: sts. stout, leafy, simple: lvs. somewhat undulate, radical oblong; cauline lanceolate, acute: fls. white, in short-peduncled, opposite cymelets, forming a long verticillate raceme; calyx very viscid, long-cylindrical, 10-nerved, in fr. clavate; petals deeply 2-parted into obovate-oblong segms.: caps. oblong. June, July. Eu., N. Asia. Var. **plèna,** Hort., is said to grow 1 ft. high and to have bright rose double fls.—Use basal cuttings.

3616. Silene Armeria. (×½)

4. **dichótoma,** Ehrh. Annual or biennial, minutely pubescent: sts. strictly dichotomous: lower lvs. spatulate, the others lanceolate, acuminate: peduncles very short, racemes in pairs, many-fld.: fls. white, sessile; calyx 10-nerved, the nerves green, more or less hirsute, oblong-cylindrical; petals 2-parted to the middle or more, the segms. obovate-oblong: caps. oblong. Eu., also intro. in N. Amer. and extensively escaped. B.B. (ed. 2) 2:67.

5. **péndula,** Linn. (*S. grèca,* Hort., not Boiss. *S. ròsea,* Hort.). Fig. 3617. Annual, crisp-pubescent: sts. 6–10 in. high, decumbent at base, dichotomously branched above: lvs. oblong-spatulate to lanceolate; floral lvs. oblong-lanceolate: fls. flesh-colored or rosy, in lax racemes, finally pendulous; calyx hirsute, reddish, 10-nerved, somewhat inflated after anthesis; petals large, obovate or 2-parted: caps. ovate. May–Aug. Medit. region. B.M. 114.—A variable species whose varieties seem to be nomenclatorially in confusion as the same form appears to bear several names; some of the forms offered in the trade are: Var. **álba,** Hort., is a white-fld. form. Var. **Bónnettii,** Hort. (*S. Bónettii,* Hort.), has brownish red sts. and lvs.: fls. shiny purple-red or dark purple. Var. **cárnea,** Hort., is a flesh-colored form of which there is a double variant known in the trade as *cárnea plèna*. Var. **compácta,** Hort., is probably a compact-growing strain rather than a true variety; occurring in several color variations and both single and double.

3617. Silene pendula. (×⅙)

G.C. III. 43:345; 55:174. Gt. 49, p. 555. G.Z. 18:32. A good bedding plant. Var. **lilácina,** Hort., is a form with rather lilac-purple fls. Var. **rubérrima,** Hort., Vilm., is a form with brownish red branches and bright rose or carmine fls. (R.H. 1884, p. 113); there is also a variation of this known in the trade as *rubérrima Bónnettii,* with reddish purple sts. and lvs. and rose-red fls., probably the same as var. *Bonnettii*.

6. **fimbriàta,** Sims. Perennial, about 2 ft. high, pubescent: sts. erect, leafy and sometimes branched from the axils: lvs. large, ovate, base more or less cordate, margin undulate; the upper lvs. lanceolate, all dark green: infl. a dichotomous panicle: fls. white; calyx whitish, inflated, ovate-campanulate, teeth short-triangular; petals cuneate at base, obovate above, deeply many-cut and fringed. Caucasus. B.M. 908.

7. **latifòlia,** Brit. & Rendle (*Cucubálus latifòlius,* Mill. *S. Cucubálus,* Wibel. *S. inflàta,* Sm. *S. venòsa,* Aschers. *S. vulgàris,* Garcke. *S. Zawádskii,* Hort., not Herbich). BLADDER CAMPION. BLADDER CATCHFLY. COWBELL. WHITE BEN. Perennial, 1–3 ft. high, glaucescent, usually glabrous: sts. ascending: lvs. elliptical or lanceolate, acuminate, base narrowed: fls. polygamous-dicœcious, numerous, white or pinkish, drooping, in corymbose cymes or panicles; calyx campanulate to subglobose, 20-nerved, glabrous, strongly inflated; petals narrow, 2-cleft: caps. ovate-globose. Eu., N. Afr., Asia, and naturalized in N. Amer. B.B. (ed. 2) 2:64.—The young shoots are said to be eaten by the poor folk of England as a substitute for asparagus; they taste something like green peas.

8. **marítima,** With. Perennial, cespitose, gray-green, 8–16 in. high: sts. numerous, the barren shoots procumbent, the flowering ascending: lvs. lanceolate or ovate-lanceolate, margin cartilaginous or crenate: fls. white, 1 or few to a st., but numerous, paniculate; calyx 20-nerved, inflated after anthesis; petals somewhat cleft and with 2 small scales at the base. June–Aug. Eu., N. Afr. Gn. 57, p. 372. G.M. 52:273.—The seaside form is said to be more glaucous than the mountain form. Allied to *S. latifolia,* but fewer- and larger-fld. Var. **plèna,** Hort. (*S. marítima* var. *flòre-*

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plèno, Hort.), grows 4–10 in. high and has fewer fls. than the type, but they are much larger, extremely double and remain in bloom longer. Niven says, "This variety makes a lovely rock-plant, and ought always to be placed in such a position that its stems, borne down by the weight of blossoms, may hang over the ledge of a rock; otherwise, if planted in a border, they get besprinkled with soil after every shower of rain." Niven adds that this variety produces no seed and is more easily prop. by cuttings than by division. Gn. 11, p. 12; 57, p. 126. R.H. 1906, p. 181. Var. **rôsea**, Niven, grows about 6 in. high and is said to have a less rambling habit and rose-colored fls. Origin unknown. This desirable form seems unknown in Amer.

9. **tatârica**, Pers. Perennial, glabrous: sts. geniculate, approximate, densely leafy: lvs. linear-oblong, attenuate toward the base, margin serrulate, glabrous: fls.

3618. Silene virginica. (×⅓)

in secund racemose panicles; peduncles opposite, 1–3-fld.; calyx subclavate, obscurely 10-striate, glabrous; petals 2-cut, the segms. oblong-linear, obtuse: caps. elliptical. E. Eu., W. Asia.

10. **Astèrias**, Griseb.; also misspelled *Asteris*. Perennial, glabrous, 3–4 ft. high: sts. tall, simple, rather viscid: lvs. lanceolate-spatulate, 4–5 in. long, obtuse, base attenuate; the uppermost oblong, elliptic-lanceolate: fls. purple, subsessile, in a many-fld., capitate cyme; calyx membranaceous, reddish, obconic-cylindrical; petals oblong, entire: caps. oblong. Macedonia and Roumania. Var. **grandiflôra**, Hort., is about 3 ft. high and has the crimson-scarlet fls. in globose heads. Balkan Mts.

11. **stellâta**, Ait. Starry Campion. Perennial, 2–3 ft. high: sts. erect, branched, pubescent: lvs. in whorls of 4 (the uppermost and lowest sometimes opposite), ovate-lanceolate, acuminate, 2–3 in. long: fls. white, nodding, in an open panicle; calyx campanulate, pubescent, inflated; petals laciniately cleft, unappendaged. Woods, Mass. to Neb., south to Ga. and Texas. B.M. 1107 (as *Cucubalus stellatus*). B.B. (ed. 2) 2:63.

12. **multicaûlis**, Guss. (*S. Waldsteìnii*, Griseb. *S. Kitaibèlii*, Vis.). Perennial, 1 ft. or less high: caudicles prostrate: sts. ascending, pruinose-scabrous below, viscid above: lvs. linear-lanceolate, acute: fls. solitary on the peduncles, greenish white; calyx pale, glabrous, cylindric-clavate, base strongly attenuate; petals linear-cuneate, 2-cut: caps. oblong. S. Eu.

13. **Douglasii**, Hook. Perennial, 1 ft. or more high, finely pubescent, scarcely viscid: sts. very slender, decumbent and geniculate at base: lvs. remote, long, linear to narrowly lanceolate-linear, 2–3 in. long: fls. white or pink, borne mostly in 3-fld., long-peduncled cymes; calyx oblong or obovate, rather narrow at base; petals 2-lobed, appendaged. June–Sept. Utah to Cent. Calif. north to Mont. and Brit. Col.—A variable species. Var. **Macoûnii**, Rob. (*S. Lyallii*, Wats.), is minutely pubescent: lvs. tapering gradually from near apex to base: calyx oblong, teeth purple-tipped. Wash. and Brit. Col., summits of the Rocky and Selkirk Mts.

14. **laciniàta**, Cav. Perennial, 1½ ft. high: sts. pubescent, decumbent and erect-branched: lvs. large, lanceolate to narrowly linear, acute, attenuate at base, subsessile: fls. axillary and terminal, paniculate, somewhat nodding, bright carmine, about 1 in. across; calyx long-cylindrical, pink with 10 green nerves, slightly inflated after anthesis; petals 4-cleft to about their middle, lobes acute. Mex. B.R. 1444. P.M. 1:267. Var. **Purpûsii**, Hort., is a dwarf, spreading plant, 6–8 in. high: lvs. narrow, green, somewhat woolly: fls. rich cardinal-red. Mex.

15. **Fôrtunei**, Vis. Perennial, 1½–3 ft. high, woody at base, scaberulous-pubescent: sts. numerous, erect: lvs. linear-lanceolate, acute, attenuate to a ciliate petiole: fls. racemose with short cymose or approximate single-fld. branches, rose or white; calyx elongate-tubular, glabrous, striæ netted above, teeth ovate, broad white-margined; petals with 2-auricled claws, blade 2-parted, the lobes more or less deeply incised: caps. oblong. China. B.M. 7649. Var. **nâna**, Hort., a dwarfer form with more deeply colored fls. Var. **rôsea**, Hort., has more brilliant pink fls. than the type.

16. **Scoûleri**, Hook. Perennial, 1½–2½ ft. high, pubescent, glandular-viscid above: root stout: sts. simple, erect: lvs. narrowly oblanceolate or lanceolate-linear, acuminate: fls. white or purplish, verticillately spicate or the lower ones in short appressed cymes; calyx clavate, nerves definite, teeth membranous and ciliate margined; petals auricled-clawed, bifid. Mountains of Ore., Idaho, and Mont., northward to Vancouver Isl.

17. **Ménziesii**, Hook. Perennial, 6 in. to 1 ft. or more high, finely glandular-pubescent: sts. weak, leafy, dichotomously branched above: lvs. ovate-lanceolate, acuminate at both ends, thin: fls. white, very small for the genus, borne in the forks of the branches and forming a leafy infl.; calyx obconical, obovate, or oblong, 2½–4 lines long; petals 2-cleft, commonly appendaged: caps. small. Mo. and Neb. to Assiniboia, westward and southward to Vancover Isl., S. Calif. and New Mex. B.B. (ed. 2) 2:68.

18. **rosiflôra**, F. K. Ward. Perennial, 6–12 in. high, branched: sts. suberect or procumbent, densely pubescent: lvs. scarcely petioled, up to 1 in. long, lanceolate, base slightly attenuate, apex acute, sparsely puberulous above, densely so beneath, margin ciliate: infl. terminal, laxly dichotomously cymose-corymbose: fls. rose; calyx tubular, 10-nerved, purple-saturated, densely glandular-pubescent; petals about ¾in. long, clawed, blade broadly obcordate.

19. **califôrnica**, Durand. Perennial, 1–4 ft. high, hirtellous-pubescent: root vertical, simple, 2–3 ft. long: sts. procumbent or suberect, leafy: lvs. lanceolate or

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ovate-elliptic, more or less narrowed at base, acuminate, rarely obtusish: fls. scarlet, large, 1 in. or more across, scattered; calyx funnelform-clavate; petals 4-lobed, commonly with 2 broad ones flanked by 2 narrower ones: caps. ovoid, concealed until dehiscence by the rather broad calyx. Coast Range, Ore. to N. and Cent. Calif.—Doubtful whether in cult.

20. **virgínica,** Linn. Fire Pink. Fig. 3618. Perennial, 1–2 ft. high, viscid-pubescent: sts. striate, single, simple: lvs. spatulate or oblanceolate, the lower narrowed to ciliate-fringed petioles, the upper sessile: fls. very large, 1 in. or more across, crimson or scarlet, loosely cymose, commonly nodding or reflexed after anthesis; calyx clavate or oblong; petals broadly lanceolate, 2 (rarely 4) -toothed at the apex. Open woods and rocky hills, N. Y. to Minn., south to Ga. and Ark. B.M. 3342. Gn. 22, p. 375. G. 8:417. B.B. (ed. 2) 2:64.

21. **règia,** Sims (*S. Bérgeri*, Hort., not Schott). Royal Catchfly. Perennial, 3–4½ ft. high: st. erect, stout, slightly viscid and rough-pubescent: lvs. sessile all but the lowest, thick, ovate-lanceolate, acute, 2–3 in. long: fls. numerous, deep scarlet, in a narrow cymose panicle, about 1 in. across; calyx oblong-tubular; petals emarginate or laciniate, crowned. July. Ohio to Ala., Tenn., and Mo. B.M. 1724. B.B. (ed. 2) 2:65.

22. **gigantèa,** Linn. Perennial, 3–4 ft. high: st. tall, stout, 4-angled below, viscid-pubescent: lvs. tomentose, the radical densely rosulate, thick, obovate, mucronate; the floral lvs. minute, linear-lanceolate: panicle long, raceme-like, with the cymes densely many-fld., remotely whorled and the uppermost sessile: fls. white; calyx hairy, obconical, 10-nerved; petals 2-parted into oblong segms.: caps. large, ovate. E. Medit. region.

23. **viridiflòra,** Linn. Perennial, 1–2 ft. high: sts. simple or branched above, soft-pubescent, very viscid above: lvs. petioled, ovate-oblong, acute: fls. greenish white, in loose, elongated panicles, few, nodding; calyx glandular, reticulately green-nerved, narrowly cylindrical; petals deeply 2-cut into linear segms.: caps. oblong. S. Eu.

24. **mellífera,** Boiss. & Reut. Perennial, cespitose, 1½–2½ ft. high: sts. erect, stout, very short-puberulent below, very viscous above: lvs. acute, pubescent, the lower and rosette lvs. oval or spatulate-lanceolate, attenuate to a long petiole; the upper lanceolate or linear: fls. small, bright green, in long lax cymose panicles; calyx umbilicous, clavate, green-striate; petals clawed, the limb deeply 2-lobed, cuneate: caps. ovate-conical. Spain, Portugal, and Algeria.

25. **Zawádskii,** Herbich. Perennial, 4–8 in. high: sts. rather erect, hirtellous-pubescent, densely villous above: lvs. rosulate, lanceolate, acuminate, narrowed to the ciliate base, densely punctulate-ciliate; cauline lvs. few, linear-lanceolate: fls. white, in a few-fld. raceme; calyx broadly ovate-campanulate, densely pubescent; petals bifid: caps. ovate. Austria.

26. **pumílio,** Wulf. Dwarf perennial: sts. a few inches high, cespitose, glabrous: lvs. linear, obtuse, ciliate: fls. solitary, rose, 1½ in. across, on slender pedicels; calyx faintly 20-nerved, oblong-campanulate, pubescent, somewhat inflated after anthesis, green or violaceous green; petals undivided or notched: caps. ovate-cylindrical. June. Austrian Alps.—A rare and choice plant. Niven says it has hard woody roots which are easily damaged in transit, and therefore those who wish the species should secure seeds.

27. **Lerchenfeldiàna,** Baumg. Low cespitose perennial, glabrous and glaucous: sts. decumbent ascending: lvs. rosulate below, long-lanceolate, acute, attenuate at base; cauline lvs. oblong: fls. 5–11, in terminal corymbose cymes, rose; the peduncles short; calyx glabrous, hyaline-membranaceous, cylindrical-clavate; petals narrow-elongate, linear, retuse: caps. ovate. S. E. Eu.

28. **acaùlis,** Linn. Cushion Pink. Moss Campion. Fig. 3619. Moss-like tufted perennial, about 2 in. high, glabrous: sts. almost lacking: lvs. clustered at the end of the much-branched rootstock, green, short, linear-subulate: peduncles 1-fld.: fls. reddish purple, ½in. across; calyx campanulate, 10-nerved, glabrous; petals slightly notched, obovate, with a small scale at the base: caps. long-cylindrical or oval. May–Aug. Eu. L.B.C. 6:568. Gn. 75, p. 285; 76, p. 614. B.B. (ed. 2) 2:63.—According to Niven, this species is readily increased by division or by seeds, which it produces sparingly. The fls. have a tendency to become dicœcious. Var. **álba,** Hort., forms dense cushions and has snow-white fls. somewhat smaller than the type. Var. **aùrea,** Hort., has golden foliage and bright rose fls. Var. **exscàpa,** Koch (*S. exscàpa*, All.), has dense bright green cushions and paler pink (according to the trade sometimes white) fls. Var. **grandiflòra,** Hort., forms moss-like tufts with crimson fls. June, July. Var. **plèna,** Hort. (*S. acaùlis* var. *flòre-plèno*, Hort.), has dense cushions of light green foliage and double bright rose fls.

29. **dianthifòlia,** J. Gay. Perennial, densely cespitose, 4–6 in. high, glabrous: sts. erect, 1 (rarely 2) -fld.: lvs. ciliate at the broadened base, narrowly linear, acute, the lower congested, the upper shorter; calyx reddish nerved, short obconic-cylindrical, teeth ovate; petals 2-parted above the middle into linear-oblong segms.: caps. ovate. Asia Minor.

30. **quadrífida,** Linn. (*S. quadridentàta*, Pers.). Perennial, 2½–4 in. high, rather glabrous, cespitosely many-stemmed: sts. slender, rather viscid, dichotomous: lower lvs. spatulate; the others linear: fls. solitary or in 3's; peduncles long and capillary, white; calyx oblong-turbinate; petal glabrous-clawed, blade obovate-spatulate, obtusely 4-lobed: caps. globose. S. Eu.

31. **alpéstris,** Jacq. Perennial, 4–6 in. high, cespitose, more or less viscid above: sts. dichotomous: lvs. mostly radical, lanceolate-linear, rather obtuse: fls. white, rather large, shining, in corymbose panicles; calyx

3619. Silene acaulis. (×½)

short, campanulate-clavate, not inflated, 10-nerved; petals obovate, 4-lobed at the apex, and with 2 teeth at the base of each petal. May–Aug. Mountains of E. Eu. Gn. 63, p. 231.—It forms a dense mass of underground sts. and is easily prop. by division or seeds. Var. **grandiflòra,** Hort., is a large-fld. form offered in the trade. G.C. III. 55:442. Var. **Richentreichii,** Hort., is offered in the trade as a smaller form, about 6 in. high.

32. **Saxífraga,** Linn. (*S. petræa*, Waldst. & Kit., not Adams). Perennial, somewhat shrubby, densely cespitose, bright green: sts. numerous, 3–10 in. high, ascending, filiform, glabrous or scabrous-puberulent, viscid above: lvs. linear or linear-lanceolate, acute, glabrous or scabrous-puberulent, margin serrulate-ciliate: fls. whitish, very often solitary or in 2–3-fld. cymes, erect on very long pedicels; calyx tubular-clavate, glabrous, 10-striate, striæ green or reddish, puberulent; petals 2-parted, the lobes oblong: caps. ovoid-oblong. Eu. and Asia Minor. L.B.C. 5:454.

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33. **odontopétala,** Fenzl. Perennial, densely pubescent: sts. 4–6 in. long, leafy, subsimple, glandular-villous above: lvs. lanceolate or linear-lanceolate, 1-nerved, acute or somewhat obtuse: fls. cymose, 1–7-fld., white; calyx pubescent, rather viscid, whitish, campanulate; petals 2-lobed: caps. ovate. Asia Minor and Syria.

34. **Elízabethæ,** Jan. Perennial, 4–6 in. high: sts. tufted, erect or ascending, viscid-pubescent: lvs. narrowly lanceolate, acute, the lower 2–3 in. long, gradually becoming smaller upward: panicle terminal; fls. bright rose to rose-purple, 1½ in. across; calyx tubular, at first cylindrical, at length oval and bladdery, pale dull green, veined and margined purple; petals 2-lobed, white-clawed, blade cuneate-flabellate, margin crenate-dentate. Italy. B.M. 5400. G. 8:412.

35. **ciliàta,** Pourr. Perennial, 3–6 in. high, pubescent, cespitose from a woody rhizome: sts. slender, simple, or slightly branched, nearly naked: lvs. of the rosette and lower st. linear-lanceolate or linear, the upper shortened and gradually narrowed from a broadened base: fls. in a few-fld. cincinnus, pedicelled, white or ivory-white; calyx clavate, short-pubescent, green-, red-brown-, or purplish striate; petals 2-lobed. Eu.

36. **rèpens,** Patrin. Perennial, 8–10 in. high, with a long repent root: sts. several, erect, simple or branched, more or less scabrous-pubescent: lvs. narrowly oblong or lanceolate, acute: fls. white, racemose-paniculate on opposite, axillary, 1–5-fld. peduncles; calyx cylindrical-clavate, inflated, 10-striate, pubescent-villous; petals 2-cut, the segms. oblong, obtuse, the claw glabrous. Russia, E. Siberia, Caucasus, China and Japan, and in N. Alaska.

37. **Reichenbachii,** Vis.; also spelled *Reichenbachiàna* in the trade. Perennial, miniature, shrub-like, tufted: sts. somewhat woody at base, puberulent below, glabrous, somewhat viscid above: lower lvs. oblanceolate-spatulate, acute, ciliate on the ribs and margin; upper lvs. linear, acute: fls. white, racemose-paniculate, nodding; peduncles usually 1-fld.; calyx linear-clavate, 10-nerved, nerves red or green, margin of teeth lanuginous; petals obovate, 2-parted: caps. oval-oblong. Dalmatia.

38. **rupéstris,** Linn. Perennial, 2–8 in. high, loosely cespitose, glabrous: sts. numerous, erect from a branched base, 1½–7 in. high: lvs. lanceolate, acute, the lower attenuate at base: fls. flesh-color, in repeatedly dichotomous cymes, numerous, long-pedicelled; the pedicels filiform; calyx obconical, base slightly umbilicate; petals obovate, deeply emarginate: caps. ovoid-oblong. Eu.

39. **caucásica,** Boiss. Perennial, 4–5 in. high, velutinous: caudicles filiform, nude: sts. ascending from below the rosette: lvs. in a rosette, oblong-lanceolate, elongated; cauline lvs. abbreviated: fls. 1, often 2–3 to a st., subsessile, white; calyx rather softly glandular-hairy, 10-nerved, narrowly cylindrical; petals obovate. Caucasus.—Closely allied to *S. vallesia,* from which it differs in being velvety instead of glandular, in having shorter cauline lvs. and almost sessile, instead of long-peduncled fls. and not inflated calyx.

40. **vallèsia,** Linn. Perennial, cespitose, about 4 in. high, viscid-pubescent: sts. assurgent, slightly branched: lowest lvs. spatulate, others lanceolate; cauline lvs. long: fls. long-peduncled, terminal, rarely in pairs; calyx very long, glandular-pubescent, somewhat inflated after anthesis; petals bifid, rose-violet above, greenish beneath, claw ciliate. High Alps.

41. **Hoòkeri,** Nutt. Perennial, tomentose-pubescent: sts. many, decumbent, 6–10 in. high, slender: lvs. 2–3 in. long, the lower elliptic-spatulate, narrowed to the petiole; the remainder elliptic-lanceolate, acute, both surfaces pubescent: fls. solitary in the lf.-axils or sometimes in terminal or axillary few-fld. cymes, 2½ in. across, pale pink; calyx soon turgid, 10-nerved, veins obscure green, with membranaceous edges; petals ciliate-clawed, limb broad, 4-cleft. Ore. and Calif. B.M. 6051. F.S. 20:2093. G.C. III. 52:44. G. 34:643. Gn. 79, p. 389.

42. **pusílla,** Waldst. & Kit. Perennial, dwarf, villous on the petioles and at the base of the sts., viscous above, cespitose, many-stemmed: sts. low, slender, leafy, dichotomous: lvs. radical, spatulate, the others short-lanceolate: peduncles long, capillary, 1 (rarely 2) -fld.: calyx glabrous or minutely glandulose, turbinate; petals glabrous-clawed, blade white, obtuse, 4-toothed: caps. ovate-globose. S. Eu.—Considered by some to be only a variety of *S. quadrifida.*

43. **Schâfta,** Gmel.; also spelled *Schaftæ.* Perennial, 3–6 in. high, pubescent-scabrous: roots woody: sts. many, arising laterally from the rosettes, weak and procumbent, short, simple or slightly branched: lvs. rosulate, small, obovate-oblong, acute: fls. rose or purple, 1–5, axillary and terminal, solitary; calyx somewhat hirsute, reddish, 10-nerved, long, cylindrical, not inflated; petals broadly obovate, notched, with 2 scales at their base, claw glabrous. June–Oct. Caucasus. B.R. 32:20. F.S. 3, p. 286C. Gn. 78, p. 135.

44. **pennsylvánica,** Michx. (*S. carolinidna,* Walt.?). Wild Pink. Perennial, 6–9 in. high, from a strong taproot, viscid-pubescent: sts. few: lvs. mostly basal, spatulate or oblanceolate, acutish, base tapering to the long, ciliate petioles; cauline lvs. 2–3 pairs, shorter, lanceolate or narrowly oblong: fls. rose or white, in small, dense, terminal cymes; calyx purplish, clavate; petals obovate, claw glabrous, appendaged, 2-lobed. Apr., May. E. N. Amer., New England to S. C. and Ky. B.R. 247. L.B.C. 1:41 (as *S. incarnata*). B.B. (ed. 2) 2:65.—*S. caroliniana* is accepted by some authors as the name of this species, but there is considerable doubt as to the identity of Walter's species and it is questionable whether the plant he described is *S. pennsylvanica.*

S. Châfta, Hort., is probably a misspelling of S. Schafta.—*S. Correvoniàna,* Hort., is offered as a rare plant growing in "compact tufts, with rosy pink fls. which almost resemble minute roses."—*S. graminifòlia,* Hort., is not recognizable, as there are three plants going under that name.—*S. Kitabeliàna,* Hort., may be S. multicaulis.—*S. orientàlis,* Mill., is according to Miller a plant with st. erect, hirsute: lvs. nerved: fls. purplish; calyx conical. It is not treated botanically by Williams, DeCandolle, Boissier, Nicholson, or Voss, but is offered in the trade as a perennial, 2–2½ ft. high: fls. bright rose, in a head. Var. *álba,* Hort. and var. *compácta,* Hort., are also offered.—*S. ptèris grandiflòra,* Hort., is offered in the trade; the species is unknown botanically.—*S. Wàrdii,* Hort., is likened to S. Schafta on a large scale: said to grow about 1 ft. high, to have a loose graceful habit and an abundance of bright pink fls. Offered in the trade.

F. Tracy Hubbard.†

SILK-COTTON TREE: *Ceiba.* **S. Flower:** *Albizzia.* **S. Oak:** *Grevillea robusta.* **S. Tree:** *Albizzia Julibrissin.* **S. Vine:** *Periploca græca.* **S.-weed:** *Asclepias.*

SÍLPHIUM (from the Greek name of an umbelliferous plant of northern Africa). *Compósitæ.* Rosinweed. Tall-growing hardy perennial herbs native of the United States which are grown for their rather large sunflower-like heads of flowers which, except in one species, are yellow.

Leaves opposite, alternate or verticillate, often forming water-holding cups by perfoliation of the st.: heads many-fld.; involucre of thick, somewhat foliaceous bracts; ray-fls. or at least their ovaries in more than 1 series, fertile, and with elongated exserted deciduous ligules: achenes much flattened, falling free or only with the subtending bract.—About 25 species. Silphiums are of easy cult. in any good soil. They require full sunlight and are prop. by division or seed.

A. *Foliage much cut.*

laciniàtum, Linn. Compass Plant. St. about 6 ft. high, leafy at the base, much less so above, very rough: lvs. 1 ft. long or more, once or twice pinnately parted, the lobes oblong or lanceolate: fl.-heads several, sessile or short-peduncled, 2–5 in. across; rays 20–30.

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July–Sept. Ohio, west and south. B.B. (ed. 2) 3:461.—It is said of this species that the st.-lvs. tend to point north and south.

AA. *Foliage not cut.*

B. *St.-lvs. small.*

terebinthinàceum, Jacq. PRAIRIE DOCK. St. about 6 ft. high, nearly or quite smooth: lvs. nearly all basal, usually 1 ft. long, ovate, cordate, dentate: fl.-heads 1½–3 in. across; rays 12–20. July–Sept.—Ont. and Ohio to Iowa and La. B.B. (ed. 2) 3:462.—A striking and decorative herb.

BB. *St.-lvs. large.*

C. *Lvs. connate-perfoliate.*

perfoliàtum, Linn. (*S. erythrocaùlon,* Bernh.). CUP PLANT. INDIAN CUP. St. square, usually dentate, branched above, about 6 ft. high: lvs. thin, ovate or deltoid-ovate, the lower contracted into margined petioles, the upper opposite, connate-perfoliate: fl.-heads 2–3 in. across, with 20–30 rays. July, Aug. Ont. to S. D. and Ga. B.B. (ed. 2) 3:460. G.W. 11, p. 473.

CC. *Lvs. petioled or simply sessile.*

integrifòlium, Michx. St. 2–6 ft., obtusely 4-angled to terete, corymbosely branched above: lvs. lanceolate-ovate to ovate-lanceolate, opposite: fl.-heads numerous, 1–2 in. across, with 15–25 rays. Aug., Sept. Western prairies. B.B. (ed. 2) 3:460. N. TAYLOR.†

SÍLYBUM (an old Greek name applied by Dioscorides to some thistle-like plants). *Compósitæ.* Erect, glabrous herbs, sometimes grown in European gardens for ornament and also for the edible heads, roots, and lvs.: lvs. alternate, white-maculate above, sinuate-lobed or pinnatifid, the teeth and lobes spiny: heads large, solitary, terminal, nodding, homogamous; involucre broadly subglobose, the bracts in many rows: fls. purplish, all perfect; corolla-tube slender, limb 5-cleft to the middle or base: achenes smooth, obovate, oblong.—Two species, Eu., Afr., and Asia.

Marianum, Gaertn. (*Cárduus Marianus,* Linn. *Mariàna láctea,* Groves). ST. MARY'S, BLESSED, or HOLY THISTLE. Annual or biennial, shining: st. 1–4 ft. high, grooved not winged: lvs. large, with strong spines: heads 1–2 in. diam.; involucral bracts leathery with a spine ½–¾in. long, the outermost mucronate; receptacle fleshy: fls. rose-purple: achenes tranversely wrinkled or smooth, black or gray. S. Eu., N. Afr., and Asia, also intro. in many places, including N. Amer.; naturalized on the Pacific coast. F. TRACY HUBBARD.

SIMARÙBA (the Caribbean name of *S. amara*); also spelled *Simarouba. Simarubàceæ.* Evergreen trees sometimes grown in the warmhouse, or hardy outdoors in the far S.: lvs. alternate, abruptly pinnate; the lfts. alternate, entire, leathery: fls. somewhat cymose, in axillary or terminal elongated and branched panicles, dicœcious; calyx small, 5-lobed, imbricated; petals 5, spreading at the top, imbricated; stamens 10 in the male fl.; ovary deeply 5-parted in the female fl.: drupes 1–5, sessile, spreading.—About 7 species, Trop. Amer.

amàra, Aubl. (*S. officinàlis,* DC.). A tall tree: lfts. oblong or oblong-lanceolate, mucronate with a bluntish point, green on both surfaces, glabrous or pubescent beneath: panicle exceeded by the lvs.: fls. yellowish white; petals spreading. W. Indies (probably not Porto Rico) and Trop. Amer.—This yields the drug known as simaruba-bark.

Tùlæ, Urban. A tree 25–50 ft. high: lfts. elliptic-oblong, short-pointed: branches of the corymb (as well as the petioles) purple-tinted: fls. bright carmine; petals much longer than *S. amara,* and having smooth, staminal scales. Porto Rico. Gt. 36:1298.
F. TRACY HUBBARD.

SIMMÓNDSIA (for the naturalist, F. W. Simmonds). *Buxàceæ.* Evergreen shrubs, sometimes cult. for ornament or for the oily seed and edible fr.: lvs. opposite: fls. dicœcious, in the lf.-axils, apetalous; sepals imbricate; staminate fls. in clusters; stamens numerous; pistillate fls. single; ovary 3-celled, 1 ovule in each cell. A single species. Related to Buxus.

californica, Nutt. PIGNUT. JOJOBA. A much-branched shrub, 5–15 ft. high: lvs. small, sessile, entire, coriaceous, oblong-lanceolate, obtuse: fls. small. S.W. Calif. to W. Mex. J. B. S. NORTON.

SINNÍNGIA (for Wilhelm Sinning, gardener at the University of Bonn). Including *Dolichodèra, Ligèria,* and *Rosanòwia. Gesneriàceæ.* Tropical herbs with handsome tubular flowers, of glasshouse culture; includes the florists' gloxinia.

Pubescent or villous, from a tuberous rhizome: lvs. opposite, usually large, petioled, the floral ones reduced to bracts: fls. usually large, solitary or fascicled in the axils, pedicelled; calyx-tube shortly and broadly turbinate, adnate, 5-angled or 5-winged, the limb foliaceous, broadly 5-cleft or -parted; corolla-tube nearly equal at the base or the posterior gibbous, long or broadly cylindrical, the upper part swollen or bell-shaped; lobes 5, spreading, or the 2 posterior smaller; stamens included, attached to the tube of the corolla; anthers broad, the cells confluent at the apex; glands of the disk 5, distinct, or the 2 posterior more crowded together or connate; ovary half inferior; style dilated at the tip; stigma concave, entire or slightly 2-lobed.—Species 20–25, Brazil. Allied to Gesnera, Isoloma, and Achimenes, and of similar cultural requirements. The genus includes the cult. gloxinia, which is properly *Sinningia speciosa,* Benth. & Hook., but which is treated in this book under *Gloxinia.* Other than this species, the sinningias are little known horticulturally, although some of the species have much merit.

speciòsa, Benth. & Hook. (*Gloxìnia speciòsa,* Lodd. *Ligèria speciòsa,* Decne.). St. short or not evident: lvs. oblong, petiolate, obtuse or acutish, villous-hairy, convex on top, usually attenuate at base, crenate: peduncles, with fls., about the length of the lvs.: fls. large, tubular, showy, usually violet or purplish; calyx-lobes ovate-lanceolate and somewhat villous, longer than calyx-tube; corolla broadly campanulate. Brazil. Variable, giving rise to such forms as var. **caulèscens,** Hanst. (*Gloxínia caulèscens,* Lindl.), with thick elongated st. and larger lvs. B.R. 1127. L.B.C. 16:1566. Var. **macrophýlla,** Hanst. (*Gloxínia speciòsa* var. *macrophýlla,* Hook.), has large white-nerved lvs. B.M. 3934. Var. **albiflòra,** Hanst. (*Gloxínia speciòsa* var. *albiflòra,* Hook.). White-fld. B.M. 3206. Var. **rùbra,** Hanst. (*Gloxínia rùbra,* Paxt.). Fls. beautiful red. P.M. 7:271. From this species, and perhaps from hybrid offspring, have descended the florists' gloxinias. To the historical discussion on pp. 1350 and 1351, Vol. III, may be added the following quotation from T. A. Sprague, G.C. III. 36, p. 88: "The turning-point in the history of our cultivated 'gloxinias,' however, was in 1845, when an erect and regular-flowered plant was raised by Mr. John Fyfe, gardener at Rothesay, Bute; this had a white corolla with a violet center, and five perfect stamens, instead of the four usual in Gesneriaceæ. Unfortunately for the systematic botanist, no exact record of its parentage was made, though in Flore des Serres, t. 311, where it was figured three years later, *Sinningia speciosa* is stated to have been one of its parents."

Regina, Sprague (*Gesnèria Regìna,* Hort.). Handsome plant about 9 in. high: lvs. broad-ovate with auriculate-cordate base and acutish apex, 4–8 in. long, somewhat velutinous above and glabrous beneath, white-veined, crenate: fls. pale violet, drooping, long-stalked, 4–6 together from the axils, and "as two suc-

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cessive pairs of leaves are usually close together on the stem, the effect is that of two many-flowered whorls, and is very fine." Brazil. G.C. III. 36:201. B.M. 8182. Gt. 53, p. 525. G.W. 9, p. 277. A handsome plant, with long flowering period. Var. **hýbrida,** Hort., is a garden hybrid with much larger fls. Var. **grandiflòra,** Hort., is advertised, the fls. "several times larger than the type, and well displayed above the handsome dark green and purplish red foliage."

conspícua, Nichols. (*Rosanòwia conspícua,* Regel). Root tuberous: st. 1 ft. high: lvs. ovate-oblong, short-acuminate, somewhat heart-shaped at the base and dentate: fls. yellow, paler on the outside, marked on the lower part of the tube with purple dots and lines; calyx-tube entirely united with the ovary, equally 5-parted, the segms. lanceolate, spreading; corolla-tube obliquely and narrowly campanulate, swollen and recurved at the base; glands of the disk 2: caps. 1-celled; seeds many.

ornàta, Benth. & Hook. (*Rosanòwia ornàta,* Van Houtte). A hybrid of the above species with a garden variety of Gloxinia with fls. of a bright red; the result is a plant resembling *S. conspicua,* but differing in having the lvs. tinted on the veins and petioles with purple and in having a somewhat more elegantly shaped fl., pure white with purple lines on the outside of the corolla-tube and the inside of a yellowish green, lined with purple. F.S. 23:2423.—Probably not now in the market. L. H. B.†

SINOFRANCHÈTIA (for Adrien Franchet, French botanist who wrote much on Chinese botany). *Lardizabalàceæ.* Deciduous climbing shrub allied to Holboellia, but easily distinguished by the deciduous lvs., by the rounded small sepals of the fls. borne in very long racemes and by the small berry-like frs. The only species is **S. chinénsis,** Hemsl. (*Holboèllia chinénsis,* Diels). Twining, to 30 ft., glabrous: lvs. long-petioled, 3-foliolate; lfts. stalked, short-acuminate, broadly cuneate at the base, entire, the terminal broadly obovate, 4–5 in. long, the lateral lfts. obliquely ovate: racemes axillary, 8–12 in. long; fls. unisexual, short-stalked, ¼in. across, white striped brownish; sepals obovate; stamens 6, free, short: carpels 3, developing into ovoid many-seeded, bluish purple berries about ¾in. across. Cent. China. H.I. 29:2842.—The long racemes of bluish purple berries are strikingly handsome: the plant has proved perfectly hardy in southern England, but is tender at the Arnold Arboretum. Prop. is by seeds and by layers, possibly also by cuttings like akebia. Alfred Rehder.

SINOMÈNIUM (*Sina,* China, and Greek, *men,* moon, meaning Chinese moon-seed). *Menispermàceæ.* A shrubby vine from E. Asia closely related to Menispermum and Cocculus; from the first it differs in the parts of the fl. being arranged in whorls and in the 9–12 stamens, and from the second chiefly in the structure of the flattened curved seed: lvs. deciduous, alternate, long-petioled: fls. dicœcious, small, in axillary and terminal panicles; sepals 6, pilose outside; petals 6, inflexed at the base and inclosing the filaments; the pistillate fls. with 9 staminodes and 3 carpels with recurved styles: fr. a drupe with a compressed crescent-shaped stone ribbed on the back. A handsome vigorous-growing twining vine with large lustrous often lobed lvs. remaining green until late in autumn, with inconspicuous fls. in long pendulous racemes and bluish black frs. It has proved only half-hardy at the Arnold Arboretum. Prop. like cocculus and menispermum.

acûtum, Rehd. & Wilson (*S. diversifòlium,* Diels. *Menispérmum acùtum,* Thunb. *Cócculus diversifòlius,* Miq., not DC. *C. heterophýllus,* Hemsl. & Wilson. *C. variifòlius,* Hort.). Twining, to 20 ft.: branchlets terete, striped, glabrous: lvs. long-stalked, ovate, acuminate, usually cordate at the base, palmately 5–7-nerved, entire or palmately lobed, rarely sagittate with 2 lobes at the base only, glabrous, 4–7 in. long: fls. ⅛in. across, greenish, in slender panicles 4–8 in. long: drupes compressed, bluish black, ⅛in. across, in pendulous panicles to 8 in. long. June; fr. in Sept. and Oct. Japan and China. G.C. III. 52:411. Var. **cinèreum,** Rehd. & Wilson. Lvs. densely grayish pubescent beneath. Alfred Rehder.

SINOWILSÒNIA (for Ernest Henry Wilson, who collected extensively in China during 1900–1910 and intro. numerous new plants into cult.). *Hamamelidàceæ.* A deciduous tree similar in foliage to Hamamelis, but in its fls. more closely related to Corylopsis, from which it is chiefly distinguished by the unisexual, apetalous fls., and the tubular-urceolate calyx-tube: fls. in pendulous racemes; tube of the calyx urceolate, inclosing the ovary, with obovate-spatulate lobes; petals wanting; the pistillate fls. with 5 staminodes opposite to the sepals; ovary with 2 long and slender styles: fr. a dehiscent 2-seeded woody caps. The only species is **S. Hénryi,** Hemsl. Shrub or tree, to 25 ft., more or less stellate-pubescent: lvs. short-petioled, membranous, broadly obovate to elliptic, acute or short-acuminate, denticulate, 4–6 in. long: calyx-tube yellowish, stellate-tomentose, nearly ¼in. long: caps. sessile, nearly ½in. long; seeds black. May. Cent. and W. China. H.I. 29:2817.—Botanically interesting, but without particular ornamental qualities; has proved hardy at the Arnold Arboretum. Prop. is by seeds and probably by layers and by grafting on hamamelis. Alfred Rehder.

SIPÀNEA (native name in Guiana). *Rubiàceæ.* Annual or perennial herbs, hispid-setose, pilose or glabrate, erect or prostrate, with terete branches: lvs. opposite, petiolate, ovate or lanceolate; stipules linear, elongate, persistent: fls. paniculate or cymose, the cymes in corymbs, axillary, terminal or dichotomously disposed, white or rose, the throat frequently golden villous; calyx-tube turbinate or ovoid, the limb with 5 elongate-subulate, persistent lobes; corolla funnelform or salver-shaped, tube elongated with the throat dilated, the limb with 5 equal, broad-ovate spreading lobes; stamens 5; disk annular; ovary 2-celled: caps. ovoid or subglobose, leathery.—About 5 species, Trop. Amer. *S. cárnea,* Neumann. Perennial herb, about 3 ft. or more high: lvs. oval, lanceolate, acute: fls. pale rose-violet, arranged in a corymb; corolla-tube cylindrical, 5-parted, oval, acute: fr. hemispherical. Cent. Amer. H.U. 4, p. 193. R.H. 1843:445.

SIPHOCÁMPYLUS (Greek, *siphon,* tube, and *kampylos,* curved, referring to corolla); sometimes misspelled *Syphocampylus. Campanulàceæ.* Herbs, subshrubs, or shrubs, sometimes climbing, glabrous, hirsute or stellate-tomentose, adapted to the warm- or coolhouse: lvs. alternate, rarely verticillate, entire or denticulate, rarely incise-dentate or pinnately lobed or divided: peduncles 1-fld., axillary or corymbosely grouped at the ends of the branches or laxly racemose: fls. often rather large, red, orange, or purplish, rarely green; calyx 5-lobed; corolla straight or incurved: caps. loculicidally 2-valved.—About 100 species, Trop. Amer.

betulæfòlius, Don. Height 2–3 ft.: st. woody at base: branches rounded: lvs. alternate, petiolate, 3–4 in. long, cordate, acuminate, doubly serrate, nearly glabrous: peduncles 1-fld., as long as the lvs., thickened upward: calyx-segms. long awl-shaped, with a few notches; corolla 2½–3 in. long, tube vermilion, limb yellow. Brazil. B.M. 3973. H.U. 5, p. 97.—Tender perennial, not cult. in Amer., but interesting as one supposed parent of *Centropogon Lucyanus,* itself of little value.

S. bicolor, Don=Lobelia laxiflora, HBK.—*S. gigantèus,* Don (Tupa salicifolia, Don) grows 14 ft. high: lvs. lanceolate, 6–9 in. long, scarcely petioled: fls. reddish yellow; corolla falcate, velvety. Ecuador.—*S. Lindleyi,* Lem., has ovate-oblong, glandulose-serrate

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lvs. and approximate red fls. Colombia. J.F. 2:142.—*S. Orbignidnus*, A. DC., is herbaceous; has ternate, ovate-acuminate, short-petioled lvs. and numerous red-and-yellow fls. in the upper axils. Bolivia. J.F. 4:425.—*S. rugòsus*, A. DC., has pendulous branches, ovate-rotund coriaceous and rugose lvs., the corolla with lanceolate, acute lobes and the caps. 10-angled. Peru. H.U. 3, p. 368.

F. TRACY HUBBARD.†

SIPHÒNIA: *Hevea.*

SISYRÍNCHIUM (an old Greek name first applied to some other plant). *Iridàceæ.* SATIN FLOWER. BLUE-EYED GRASS. RUSH LILY. Hardy or half-hardy perennials, usually with fibrous roots, sometimes used in the hardy border.

Stems simple or branched, 2-edged or winged: lvs. grass-like, lanceolate or terete: fls. small, fugacious, in umbellate clusters from a usually 2-lvd. spathe, blue or yellow, perianth nearly flat or bell-shaped, segms. 6, nearly alike: caps. globular, 3-angled.—About 150 species, all American, mostly in moist fields and sandy places and along shores. The species are of easy cult. in any good garden soil. They are very little known as horticultural subjects.

A. *Fls. yellow.*

B. *St. leafless.*

califórnicum, Dry. (*Marica califórnica*, Ker-Gawl.). A half-hardy perennial: st. 1½ ft. high, 2 lines through, broadly winged: lvs. many, shorter than the st., about ½in. broad: spathe 3–6-fld.: segms. of perianth yellow, lined with brown, ½in. long: caps. oblong. Calif. to Ore. B.M. 983.—Swampy grounds.

BB. *St. lf.-bearing.*

C. *The st. slightly 2-edged.*

tenuifòlium, Humb. & Bonpl. A half-hardy perennial: roots fleshy, fibrous: st. ¼–1 ft. high, often branched low down: lvs. subterete or narrowly linear: spathes 3–4-fld.; segms. of perianth pale yellow, ⅓in. long. Mountains of Mex. B.M. 2117; 2313.

striàtum, Smith (*S. lutéscens*, Lodd. *Marica striàta*, Ker-Gawl.). Perennial, 1–3 ft.: sts. compressed-ancipital, leafy: lvs. ensiform, glaucous, radical equitantly imbricate toward their base, cauline remote, clasping: fls. in sessile fascicles laxly and closely disposed along the flexuous rachis, yellow, darker striate at center, about ¾–1 in. across; perianth-segms. cuneate-ligulate, the outer ones twice as broad as the inner, blades rotately spreading, obtuse and mucronate. Chile and Argentina. B.M. 701. L.B.C. 19:1870. Gn. 70, p. 202. R.H. 1910, p. 457.

CC. *The st. broadly winged.*

convolùtum, Nocca. A tender perennial: root fibrous, slender: st. about 1 ft. high, usually forked: lvs. linear: spathes 3–4-fld.: segms. of perianth yellow, veined with brown, ½in. long. Trop. Amer.

AA. *Fls. purple, blue, or white.*

B. *St. terete.*

grandiflòrum, Douglas (*S. Douglasii*, A. Dietr.). A hardy perennial: root-fibers slender, long: st. simple, about 1 ft.: lvs. short, sheathing the lower part of the st.: fls. 2–3, cernuous; perianth-segms. bright purple, rarely white, ¾in. long. May, June. N. W. U. S. B.M. 3509. B.R. 1364. G. 2:100; 5:559.—This is possibly the handsomest species in the trade. **Var. álbum,** Hort., is also offered and is equally desirable.

BB. *St. flat.*

C. *Spathes equal in length.*

graminoides, Bicknell (*S. ánceps*, Wats., not Cav.). A hardy perennial: st. winged, about 1 ft. high, usually terminating in 2 unequal branches, subtended by a lf.: lvs. nearly equaling the st., grass-like, 1–3 lines wide: spathes about 1 in. long, 2–4-fld.; pedicels longer than the spathes: fls. blue, ½–¾in. across. April–June. E. U. S. B.B. 1:453.

CC. *Spathes very unequal in length.*

angustifòlium, Mill. (*S. ánceps*, Cav. *S. bermudiànum*, Authors). A hardy perennial: root-fibers long: st. about 1 ft. high, 1½ lines through, with 2–3 clusters on long-winged peduncles: lvs. linear, shorter than the st., 1–1½ lines wide: spathes 1–4-fld., about 1 in. long: pedicels about 8 lines long. May–Aug. Maine to Va., west to Colo. Var. **béllum,** Hort. (*S. béllum*, Wats.). Sts. more narrowly winged, usually without any lf. below the fork: spathes shorter: pedicels longer. Calif., New Mex.

mucronàtum, Michx. Hardy perennial similar to the last: sts. narrowly winged: spathes usually purple-tinged, not gibbous; outer bract with the margins united a little above the base, ¾–2¾ in. long, the inner ¼–¾in. long: perianth violet (rarely white): caps. straw- or greenish yellow. W. Mass. to Va. and Mich. B.B. (ed. 2) 1:544.

F. W. BARCLAY.
F. TRACY HUBBARD.†

SITOLÒBIUM (name refers to the grain-like fructification). *Polypodiàceæ.* Under this name one fern is still listed, but the group now forms a section of Dicksonia or Dennstædtia characterized by prostrate rhizome and a cup-shaped nearly spherical involucre placed at the base of the depression of the lobes. The fern in question is *Dennstædtia cicutària*, Moore (*Sitolòbium cicutàrium*, J. Smith. *Dicksònia cicutària*, Hook. & Baker), a W. Indian species with bipinnate lvs.: lower pinnæ 12–18 in. long and 6 in. broad, with deeply cut linear-acuminate pinnules, the segms oblong-deltoid and deeply cut.

SÌUM (from *Sion*, old Greek name used by Dioscorides). *Umbellíferæ.* Glabrous herbs, including one of economic value, *S. Sisarum* or skirret (which see), the roots of which are used as a vegetable: lvs. pinnate, the pinnæ dentate: umbels composite, terminal or lateral; involucres and involucral bracts numerous: fls. white; calyx-teeth acute; petals inflexed: fr. ovate or oblong, laterally compressed or constricted at the junction of carpels.—About 4 species, northern hemisphere, also one species in S. Afr., apt to be subaquatic.

Sisàrum, Linn. SKIRRET. Plant, 3–4 ft. high, tuberous-rooted: lvs. pinnatisect; segms. oblong-acute, serrate: involucre 5-lvd., reflexed. E. Asia.

latifòlium, Linn. WATER PARSNIP. Sts. 3–5 ft. high, angular, furrowed and erect: lvs. pinnate; lfts. oblong-lanceolate, evenly serrate, pointed: umbels terminal; involucral lvs. many, lanceolate. Ditches and rivers, England.—Like Ferula and certain other umbelliferous plants, it is valued more for its stately habit and handsome foliage than for its fls. F. TRACY HUBBARD.

SKÍMMIA (Japanese, *Skimmi*, meaning a hurtful fruit). *Rutàceæ.* Ornamental woody plants grown chiefly for the bright red berries and the handsome foliage.

Evergreen glabrous shrubs: lvs. alternate, short-petioled, entire, dotted with translucid glands: fls. perfect or dicœcious, the staminate fragrant and in large panicles; sepals and petals 4–5; stamens 4–5; style with 2–5-lobed stigma; ovary 2–5-loculed: fr. a drupe with 2–4 1-seeded stones.—Four species from the Himalayas to China and Japan.

The skimmias are densely branched, usually low shrubs with medium-sized generally oblong acute leaves, small white flowers in terminal panicles and showy bright red, rarely black, berry-like fruit. They are tender, not being reliably hardy as far north as Washington, D. C. *S. Fortunei* is somewhat hardier than *S. japonica.* Handsome shrubs for borders of evergreen shrubberies and especially valuable for planting in cities, as they belong to the best smoke-enduring evergreen shrubs; they are particularly beautiful when

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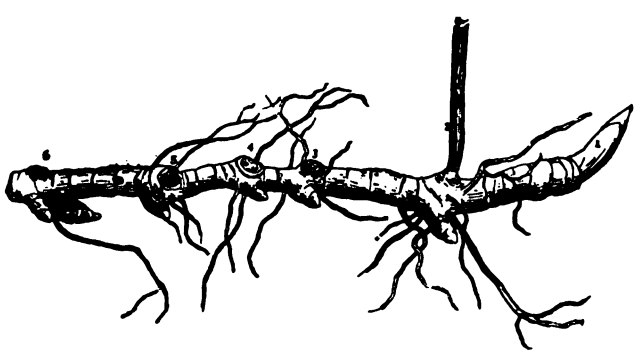
covered with their bright red fruits, which are retained through the whole winter if not eaten by birds. In the greenhouse two crops of berries on a plant may be seen occasionally. The skimmias are of rather slow growth and thrive best in a sandy loamy soil, but also grow well in strong clay; they prefer a partly shaded situation. On account of their handsome fruits they are sometimes cultivated in pots in a sandy compost of peat and loam. As the skimmias are polygamous and mostly unisexual, it will be necessary to plant staminate plants among the pistillate ones to secure well-fruited specimens. Propagation is by seeds sown in fall or stratified and by cuttings under glass with gentle bottom heat. William Scott writes: "Seeds sown in the fall and grown along in a coolhouse during winter can be planted out in a good loam the following spring, when they will make a vigorous growth, and can be lifted the following October. Their red berries make them very desirable as a Christmas berry plant."

japónica, Thunb. (*S. oblàta,* Moore. *S. fràgrans,* Carr. *S. fragrantíssima,* Hort.). Shrub, 5 ft. high, except the minutely pubescent infl. quite glabrous: lvs. crowded at the ends of the branchlets, short-petioled, elliptic-oblong to oblong-obovate, narrowed at both ends, obtusely pointed, bright or yellowish green above, yellowish green beneath, 3½–5 in. long: panicles 2–3½ in. long; fls. polygamous, usually 4-merous, yellowish white: fr. coral-red or bright scarlet, globose or depressed-globose, ⅓in. across. Spring. Japan. S.Z. 1:68. B.M. 8038. G.C. II. 25, p. 244; III. 5, pp. 521, 524. Gn. 7, p. 183; 35, p. 480; 42, p. 133. J.H. III. 30, p. 525; 66:175; 70:343. R.H. 1869, p. 259; 1880, p. 56. F. 1865, p. 161. G.W. 5, p. 261.—*S. fragrans* and *S. fragrantíssima* are names of the staminate plant; *S. oblata* of the pistillate. Var. **ovàta,** Rehd. (*S. oblàta ovàta,* Carr.), has larger and broader lvs. Var. **Veìtchii,** Rehd. (*S. oblàta Veìtchii,* Carr.), has obovate lvs. and often perfect fls. R.H. 1880, p. 57.

Fórtunei, Mast. (*S. japónica,* Lindl.). Similar to the preceding but of dwarfer habit: lvs. lanceolate or oblong-lanceolate, acuminate, dark green above, light green beneath, 3½–10 in. long: fls. white, in oblong-ovate panicles, perfect: fr. obovate, dull crimson-red. Spring. China. G.C. II. 25, p. 245 (as *S. oblata*); III. 5, p. 525. The following as *S. japonica:* B.M. 4719; F.S. 7, p. 39; Gn. 7, p. 183, and 8, p. 519; G. 1:40; R.H. 1869, p. 259, and 1880, p. 56. This species fruits more freely than the preceding. Var. **rubélla,** Rehd. Peduncles, pedicels, and buds reddish; staminate form. R.H. 1874:311; 1885, p. 189. Var. **argéntea,** Mast., has the lvs. bordered with white. A hybrid between this and the preceding species is probably *S. intermèdia,* Carr., with narrow oblong-elliptic lvs. dark green above. To this hybrid belong also *S. Fóremanii,* Hort., with lanceolate or oblanceolate yellowish green lvs. and subglobose and obovate fr. on the same panicle (G.C. III. 5:553. Gn. 61, p. 160; 67, p. 57) and *S. Rógersii,* Hort., with similar but deep green lvs. and globose squarish fr.

S. Laurèola, Sieb. & Zucc. Shrub, 5 ft. high, of a strong aromatic odor when bruised: lvs. narrow-oblong to obovate, acute or acuminate, bright green: fls. 5-merous. Himalayas. G. 32:255.—*S. melanocárpa,* Rehd. & Wilson. Shrub, or small tree, to 15 ft.: lvs. oblong-lanceolate or lanceolate, dark green and lustrous above, 1½–3½ in. long: fls. dicœcious, in panicles about 1½ in. long: fr. purplish black, globose, ⅓in. across. W. China, Himalayas.

ALFRED REHDER.



3620. Rootstock of Smilacina racemosa. The figures designate the position of the stalks in the different years. Between each of the figures or scars is a year's growth. (×½)

SKIRRET (*Sium Sisarum,* Linn.) is a vegetable of minor importance, the roots of which are used like salsify or oyster plant. It is a hardy perennial umbelliferous herb, native to eastern Asia. It grows 3 to 4 feet high, has pinnate foliage and small white flowers in compound umbels. The roots grow in large clusters, something like those of a sweet potato or dahlia, but they are much longer, more cylindrical, and somewhat jointed. The roots have a sweet and slightly floury taste and, if well grown, are tender. The chief objection to this vegetable is the woody core, which must be removed before cooking, as it is not easily separated from the fleshy part at the table and detracts from its quality. The thickness of the core varies greatly, no matter whether the plants are propagated by seed or otherwise.

Skirret needs a rich soil. The seeds may be sown in autumn or spring and the plants yield well the first season. For European practice Vilmorin recommends that the seedlings be grown in a seed-bed until they have made four or five leaves and then transplanted into permanent quarters. Sow the seed in drills ½ inch deep, and thin out the seedlings to 8 inches in the row. The roots may be left outdoors in the ground all winter, but others advise storing them in sand or earth.

WILHELM MILLER.

SKUNK CABBAGE: *Symplocarpus fœtidus.*

SLIPPER FLOWER: *Calceolaria.* **Lady's:** *Cypripedium.*

SLOE: *Prunus spinosa.*

SMALL-FRUIT: Blackberry, Blueberry, Currant, Dewberry, Gooseberry, Raspberry.

SMELÓWSKIA (named for Prof. T. Smelowski, botanist of St. Petersburg, died 1815). *Cruciferæ.* Somewhat cespitose gray-white-tomentose perennial herbs, rather rare in cult., suitable for the rock-garden: lvs. pinnately or bipinnately cut: fls. racemose, without bracts, white or yellow, frequently small; sepals short, lax, uniform at the base: silique rather short, narrowed at both ends, somewhat 4-sided or laterally compressed; seeds few, arranged in one series.—About 10 species, Asia and N. Amer.

calýcina, C. A. Mey. Low, tufted perennial, very variable in foliage: lvs. soft, usually deeply pinnatifid, with 2 or several pairs of linear to obovate, obtuse segms. and a terminal one: rarely a few lvs. entire: racemes at first dense and subcorymbose, but elongating in fr.: fls. white or nearly so; petals about 2 lines long. Arctic regions.—Recommended by some persons for rock-gardens, but it does not seem to be advertised in Amer. F. TRACY HUBBARD.†

SMILACÌNA (resembling smilax). *Liliàceæ.* FALSE SOLOMON'S SEAL. Perennial herbs, with simple stems from rootstocks (Fig. 3620), used for the hardy border or the wild-garden.

Leaves alternate, nerved, and usually sessile: panicles or racemes terminal; fls. white or greenish white, sometimes fragrant; perianth 6-parted, spreading, withering-persistent; stamens 6; ovary 3-celled: berry globular, 1–2-seeded.—About 25 species, N. and Cent. Amer. and Temp. Asia. Vagnera is an older name for this genus and is used by some American writers; but on the principle of fifty years of established usage, Smilacina is retained in the "nomina conservanda" list of the Vienna Congress.

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Smilacinas are of easy culture in any good soil. They prefer a rich loam in a moist but not wet partly shaded place. They are handsome plants both in foliage and flower, particularly when growing with natural companions. *S. racemosa* is probably the most attractive. The plants may be forced slowly for bloom in the late winter and early spring.

3621. Smilacina racemosa. (× about ⅙)

davùrica, Turcz.; also spelled *dahurica.* St. many-lvd., rather pilose: lvs. alternate, semi-clasping, oblong, glabrous above, rather pilose beneath: racemes terminal; pedicels in pairs or ternate. Dahuria and Japan. — Related to *S. stellata,* which is distinguished by the solitary pedicel.

paniculàta, Mart. & Gal. Glabrous herb: sts. erect: lvs. ovate-lanceolate, long-acuminate, 5–6 in. long, much narrowed at the very base, main nerves 5–7: panicle terminal, racemosely branched, 2¼ in. long and as much across, all parts snowy white: fls. about 4 lines across; perianth-segms. elliptic; ovary ovoid. Mex. B.M. 8539.

racemòsa, Desf. (*Vagnèra racemòsa,* Morong). Figs. 3620, 3621. Rootstock rather stout: st. 1–3 ft. high: lvs. 3–6 in. long, oblong-lanceolate or oval, sessile or nearly so: fls. numerous, in a panicle: berry ¼in. through. In shaded or partly shaded places throughout the greater part of the U. S. B.B. (ed. 2) 1:515. A.G. 13:519.

sessilifòlia, Nutt. (*Vagnèra sessilifòlia,* Greene). Rootstock slender: st. 1–2 ft. high, slender: lvs. 2–6 in. long, lanceolate, acute, flat and spreading: raceme open, sessile, or short-peduncled: berry 3–5 lines through. Early summer. Pacific States.

stellàta, Desf. (*Vagnèra stellàta,* Morong). Very near to *S. sessilifolia:* lvs. usually folded and ascending: raceme shorter and more crowded. May, June. Moist soil, greater part of the U. S. B.B. (ed. 2) 1:516.

trifòlia, Desf. (*Vagnèra trifòlia,* Morong). Rootstock slender: st. 2–15 in. high: lvs. sessile, oval to oblong-lanceolate, 2–5 in. long: fls. in a simple raceme, few to several: berry ¼in. through. Bogs and moist soil in the N. U. S. and Asia. B.B. (ed. 2) 1:516.

S. bifòlia, Schult. f.=Maianthemum bifolium.

F. W. Barclay.
F. Tracy Hubbard.†

SMÌLAX (ancient Greek name). *Liliàceæ.* The greenbriers, useful for winter greens and outdoor planting.

Usually woody climbers with paired tendrils on the base of the petiole; sometimes shrubs or herbaceous perennials, young shoots little branched, old woody shoots becoming much branched above; shoots arising from a rootstock, slow-growing and woody or with large fleshy tubers; in some species with long creeping rhizomes: lower lvs. reduced to scales, the upper simple or slightly lobed, 3–7 (or more) -nerved, deciduous to completely evergreen, usually variable in outline on different types of branches: fls. rather small, dicecious, usually numerous in axillary peduncled umbels; pedicels uniform in length: berries normally globose, 1–6-seeded, blackish or red.—Over 200 species generally distributed over the world.

The genus Smilax, of which there are twenty-five species native to the United States, has been used very little in this country for planting in ornamental grounds, its value as a decorative plant having been largely ignored. The vines of the wild plants have been gathered locally for decorations and *S. lanceolata,* the Florida smilax of the trade, is extensively shipped from the southern states to the northern centers for use in large decorations. Most of the common woody species of the North are unsuited for planting in restricted areas as they spread rapidly by underground stems. None of the native species listed below is ordinarily handled by nurserymen.

The smilax of florists is *Asparagus asparagoides.* See p. 3175; also p. 409, Vol. I.

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KEY TO THE SPECIES.

A. *Shoots herbaceous.*
  B. *Fls. carrion-scented* ..... 1. **herbacea**
  BB. *Fls. not carrion-scented* ..... 2. **lasioneuron**
AA. *Shoots woody.*
  B. *Umbels in axils of normal lvs.*
    C. *Foliage completely deciduous.*
      D. *Plant not at all glaucous: berries green-black, usually 1-seeded: rootstock short, woody, slow-growing, without long rhizomes: spines long, slender, black, dense below.*
        E. *Lvs. orbicular to ovate, not crenulate* ..... 3. **hispida**
        EE. *Lvs. triangular, ovate, crenulate* ..... 4. **Sieboldii**
      DD. *Plant, i.e., pedicels, fls., and fr. glaucous: berries 3-seeded: rootstocks long and creeping: spines stout, few, never at nodes.*
        E. *Berries blue-black: lvs. broad, ovate: st. green* ..... 5. **rotundifolia**
        EE. *Berries coral-red.*
          F. *Lvs. broad-ovate: st. stout, green* ..... 6. **excelsa**
          FF. *Lvs. oblong: st. slender, brown* ..... 7. **Walteri**
    CC. *Foliage at least partly evergreen.*
      D. *Flowering in the spring: fr. ripe the same season: lvs. partly deciduous in the N.: plants with long-creeping rhizomes.*
        E. *Lvs. glaucous, entire-margined: sts. glabrous below, slender, brownish: berries 3-seeded, blue-black* ..... 8. **glauca**
        EE. *Lvs. green, on vegetative sts. usually hastate and spiny-margined: sts. stout, green, stellate pubescent below: berries 1-seeded, greenish black.* 9. **Bona-nox**
      DD. *Flowering in the summer: fr. ripe the next season: lvs. evergreen: underground sts. large, short, fleshy tubers, without long rhizomes.*
        E. *Lvs. thin, lanceolate to ovate, slightly glaucous beneath: berries mostly 3-seeded: not a swamp plant* ..... 10. **lanceolata**

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EE. *Lvs. thick, narrow-oblong, green beneath: berries 1-seeded: growing in swamps.* 11. **laurifolia**

BB. *Umbels borne on special leafless flowering branches on the old wood: exotic species.*

C. *Flowering branch spike-like, with numerous umbels: plant and lvs. spiny*.....12. **aspera**

CC. *Flowering branch short, with 1 or 2 umbels: plant unarmed*.....13. **australis**

1. **herbàcea,** Linn. A hardy perennial vine 4–10 ft. high, unarmed: lvs. ovate to lanceolate, acute to cuspidate, obtuse or cordate at base, long-petioled, 7–9-nerved, glabrous and glaucous beneath: umbels 15–80-fld., long-peduncled: fls. carrion-scented: berry bluish black, about ¼in. diam., normally 3–6-seeded. April–June. N. E. U. S. B.M. 1920. B.B. (ed. 2.) 1:527.—This species is undesirable on account of the strong carrion odor of the fls. There are several herbaceous species in N. Amer. and E. Asia, but only this and the following have been intro. to the trade.

2. **lasioneûron,** Hook. (*S. herbàcea* var. *inodòra,* Hort. *Neméxia herbàcea* var. *mélica,* A. Nels). Similar to the above but with the lvs. pulverulent-pubescent beneath: peduncles shorter than the lvs.: fls. not carrion-scented. From Colo. to Man. in the Great Plains and E. Rocky Mts.—Distinguished from the other herbaceous forms by the lack of the carrion odor.

3. **híspida,** Muhl. (*S. Pseùdo-china,* Auth., not Linn.). Bamboo Brier. Fig. 3623. Rootstock short, woody, slow-growing, never spreading far: sts. clustered, high-climbing, 20–50 ft., green, densely spiny below, unarmed or nearly so above: spines straight, black, slender, usually most numerous at lower nodes, never on upper nodes: lvs. ovate, larger ones heart-shaped, deciduous: peduncle longer than the petiole. Conn. to Minn., south to N. C. and Texas, absent from the coast. B.B. (ed. 2) 1:529. G.F. 5:53 (adapted in Fig. 3623).—This is the only one of the northern species that does not spread rapidly by rootstocks; by proper attention to pruning this species will make an upright hedge-plant of merit.

4. **Sièboldii,** Miq. Closely related to *S. hispida* from which it differs in its weaker habit, more pointed narrower lvs. which in the growing plant are distinctly crenulate: peduncles fewer-fld. and little longer than petioles. Japan and Korea.

3622. Smilax glauca. (× about ½)

5. **rotundifòlia,** Linn. Horse-Brier. Rootstock scarcely tuberous, long-creeping: sts. stout, green, often angled, never spined at nodes: spines stout, few, black-tipped, straight, often absent on flowering branches: lvs. ovate to orbicular: peduncle scarcely longer than the petiole: berries blue-black, glaucous, less than ¼in., 3-seeded. Nova Scotia to Ill., south to Ga. and Texas. The common horse-brier of the E. U. S. B.B. (ed. 2) 1:528.—A rank weedy vine with nothing to recommend it for general planting as it spreads rapidly by underground rhizomes.

6. **excélsa,** Linn. Similar to the above in habit: sts. large, angled, with few heavy spines: lvs. heavier and larger: fls. 3–10 in umbel: berries ⅓in. diam., coral-red. Persia, S. Eu. to Azores.

3623. Smilax hispida. (× about ½)

7. **Wâlteri,** Pursh. Underground sts. slender, creeping: st. slender, terete, brownish: armed below with stiff short spines, naked above: lvs. ovate to oblong: umbels few-fld. on short peduncles: berries over ⅓in., densely packed in umbels, bright coral-red, white-berried sports are known. Swamps in sandy regions, N. J. to Fla. west to Mississippi River Valley. B.B. (ed. 2) 1:530.—The berries of this species are useful for winter decorations in the holiday season.

8. **glaûca,** Walt. Cat-Brier. Fig. 3622. Underground sts. spiny, tuberous but with long slender rhizomes: sts. slender, brown, spines below, disappearing above, when present always some at nodes: spines stout, recurved: the entire ovate lvs. and often whole plant glaucous: berries 3-seeded, small, peduncles and pedicels slender, longer than petioles. Dry ground, Mass. to Fla. and Texas. B.B. (ed. 2) 1:528. G.F. 5:425 (adapted in Fig. 3622).—Ordinarily counted a bad weed, but perhaps of use in large landscape plantings.

9. **Bòna-nóx,** Linn. Saw-Brier. Underground sts. spiny, often with large tubers, also long, creeping rhizomes: sts. stout, green, densely covered with stiff spines below, lower part of large sts. with a characteristic stiff stellate pubescence not found elsewhere in the genus: lvs. variable, on vegetative branches distinctly hastate or with basal lobes, spiny on margins and midnerve below, smooth and green on both sides; upper lvs. triangular, ovate, thick, fine net-veined: peduncles much longer than petioles, flat, many-fld.: berries 1-seeded, black, not glaucous. Va. and Fla. west to Kans. and N. Mex. B.B. (ed. 2) 1:529.—A rank-growing vine that becomes a bad weed along borders of woods and in half-wooded pastures.

10. **lanceolàta,** Linn. Florida Smilax. Underground sts. short, large, fleshy tubers, densely clustered, suggesting large potatoes: sts. stout, often ¾in. diam., lightly scabrous, glaucous when young, spiny below with stout recurved spines, unarmed above,

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climbing to the tops of tall trees often 70–80 ft., much branched above: lvs. thin, evergreen, glaucous beneath, ovate to lanceolate, 2–4 in. long: peduncles shorter than petioles, flowering in summer: young berries remaining over winter and ripening the next summer; berries 3-seeded, ¼in. or more diam. Va. to Fla., Ark., and Texas. July, Aug. B.B. (ed. 2) 1:530.—The best American smilax for cult. as an ornamental vine.

11. **laurifòlia,** Linn. False China Brier. Similar to the above in habit: lvs. narrow, oblong, thick, green on both sides, turning dark brown on wilting: berries smaller, 1-seeded. N. J. south to Fla. and Texas. July, Aug. B.B. (ed. 2) 1:530.—This plant is always found near water, usually associated with *S. Walteri*.

12. **áspera,** Linn. A half-hardy shrub often somewhat scandent, unarmed or with spines: lvs. ovate-deltoid or lanceolate, 1½–6 in. long, usually blotched with white, 5–9-nerved: fls. white, sweet-scented, in many-fld. umbels: berries ¼in. thick, usually 3-seeded, shining red. S. Eu. to India. Gn. 28, p. 615; 62, p. 397. G. 6:315 (as *S. tamnoides*). Var. **mauritánica,** Gren. & Godr. A more robust form with larger lvs. and fewer spines. Canaries, S. Eu., N. Afr.

13. **australis,** Brown. Sts. terete, robust, rarely spined: lvs. ovate-elliptic, base obtuse, 2–5 in. long, 7-nerved: umbels 1–2 on a short flowering branch without lvs., 15–20-fld. from a globose bracted receptacle: berries about ⅓in. diam. Austral.—A tropical plant unsuited to our colder climate.

S. argyræa, Lind. & Rod. Tender foliage plant: st. wiry, slender, armed with short, stout thorns: lvs. lanceolate, becoming 8–10 in. long, dark green, blotched with gray, 3-nerved, short-petioled: fls. and fr. unknown. Bolivia. I.H. 39:152. J.H. III. 46:77. According to G.F. 8:305 the above species is a robust healthy plant doing well in a moderate temperature and quickly forming ornamental specimens. It should be given a rich, fibrous soil and a light and sunny position. It may be prop. by half-ripe cuttings of the side shoots with 2–3 eyes inserted in a moderately warm bed. This may be any one of a number of S. American species. The variegated foliage is found in practically all of the woody plants of this genus, being strongly developed in S. glauca, S. Bona-nox and S. lanceolata.

J. B. Norton.

SMILAX, FLORISTS'. The smilax of florists is an Asparagus (*A. asparagoides*, page 409). It is one of the most popular of all greenhouse vines for use in decoration.

Commercially, smilax is grown in deep solid beds under glass, and the tall growth is tied to strings. These strings are cut for sale. Some growers do not renew their beds of smilax for three or four years. It is doubtless most profitable to replant every year with young stock, grown from seed. It is a heavy feeder. A strong loam with one-fifth half-rotted cow-manure is the best compost for the bed. A light house is not essential. The middle of an equal-span house running north and south is an ideal place for it, if there is height sufficient to run up the strings 7 or 8 feet. Plant as early as possible in July. Many florists who grow a few hundred strings of smilax make the mistake of putting them in a cool-house. It will grow in a temperature of 50°, but not profitably; 60° at night, and even 65°, is the better temperature. The plants should be 8 inches apart in the row and 10 inches between rows. Red-spider attacks the smilax, but daily syringing is a sure preventive. When cutting the strings, avoid picking out one here and there. Begin to cut at one end of the bed, and as much as possible clear off all the strings, because when denuded of so much growth the fleshy roots are liable to rot if over-watered; little water is needed till young growth starts. Care should also be taken in cutting, for many times there will be several young growths a foot or so high that can be saved for a future string, and they may be useless if cut. Good drainage should always be provided.

Smilax for planting in July should be raised from seed sown in February. When 2 or 3 inches high, and showing its character-leaves, it should be potted in 2-inch pots. In May, the plants should go into 3-inch pots. It is very important that the first growth, which is always weak, should be made in these 3-inch pots; then, when planted out, the first growth in the beds is strong enough to make salable strings. Never neglect tying up smilax as soon as the preceding crop is cut. For this purpose use silkaline or similar green twine. Contrary to what is the case with many plants, the hotter smilax is grown the hardier and more durable the leaves, providing it is not cut prematurely.

William Scott.

SMITHIÁNTHA (*Smith's flower*, named for Miss Matilda Smith, botanical artist, Kew). A name proposed for the species of Nægelia of Regel (which see), a name which had been given four years earlier to a genus of fungi; it is accepted by Fritsch in Engler & Prantl's "Pflanzenfamilien." The names under Smithiantha of the cult. kinds are: *S. cinnabarina*, Kuntze, *S. zebrina*, Kuntze, *S. multiflora*, Fritsch (*S. amabilis*, Kuntze), *S. achimenoides*, Fritsch.

SMODÍNGIUM (Greek, *indurated mark;* from the callous fr.). *Anacardiàceæ*. Glabrous shrub, allied to Rhus: lvs. alternate, long-petioled, trifoliate; the lfts. lanceolate, coarsely serrate: fls. minute, in terminal pubescent panicles, polygamous; calyx 5-toothed, persistent; petals 5, oblong, spreading, deciduous; disk small, annular; stamens 5; ovary free, sessile, 1-celled: fr. compressed, winged-margined, oblique-oblong, vittate on both sides; the shell leathery. One species, S. Afr. *S. argùtum*, Mey. Erect or climbing shrub with striate branches: lvs. palmately 3-foliate; lfts. 4–5 x 1 in., lanceolate acuminate, coarsely and sharply toothed: fls. in an ample panicle. S. Afr. R.H. 1908, p. 385. It has been mentioned in cult. in the warm part of the U. S.

SMOKE TREE: *Cotinus Coggygria.*

SMUT. Diseases of many cultivated cereal grasses and other plants caused by the attacks of fungi of the order Ustilaginales. The mycelium sometimes produces swellings on various parts of the host (or attacked plant), the swellings being eventually filled with brownish or blackish spores known as chlamydospores, which emerge, as a fine dust-like powder, when the outer membrane of the tissues bursts or cracks. The chlamydospores produce upon germination a structure known as a promycelium (basidium) which gives rise to lateral or terminal sporidia (basidiospores). The smut on Indian corn may be taken as typic. The disease usually appears first on the leaves, afterward at the junction of leaf-sheath and blade; finally the ear of corn is attacked, and the tassel. On the leaves blisters are found; on the ear, large whitish polished swellings appear. As the spores mature, the swellings become darker in color, and the inclosing membrane finally ruptures, exposing the dark olive-green mass of spores which are 8 to 12 μ (Greek micron) and are beset with fine spines. Unlike most other cereals, maize can be inoculated at any age. Several smuts have been described, viz., loose smut of oats (*Ustilago avenæ*), maize and teosinte smut (*Ustilago zeæ*), loose smut of wheat (*Ustilago tritici*), smut of blue-stem grass (*Sorosporium syntherismæ*), rye smut (*Urocystis occulta*), onion smut (*Urocystis cepulæ*), and colchicum smut (*Urocystis colchici*). For the loose smut of oats and wheat, the treatment of the seeds with hot water before planting is efficacious. The corn smut is best controlled by destroying the affected plants before the spores mature. The onion smut is due to infected soil which may be treated with sulfur, or formalin. John W. Harshberger.

SNAKE CUCUMBER: A form of *Cucumis Melo*. **S. Gourd:** *Trichosanthes*. **Snakehead:** *Chelone.*

SNAKEROOT: **Black S.:** *Cimicifuga racemosa* and *Sanicula marilandica*. **Button S.:** *Liatris*. **Canadian S.:** *Asarum*. **Seneca S.:** *Polygala Senega*. **White S.:** *Eupatorium ageratoides.*

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SNAKE'S BEARD: *Ophiopogon.* **Snake's-Head Iris:** *Hermodactylus.* **Snake's-Head Lily:** *Fritillaria Meleagris.* **Snake's Mouth:** *Pogonia.* **S. Tongue:** *Ophioglossum.*

SNAPDRAGON: *Antirrhinum.*

SNEEZEWEED: *Helenium.* **Sneezewood:** *Ptærozylon.* **Sneezewort:** *Achillea.*

SNOWBALL TREE: *Viburnum Opulus.* **S.-berry:** *Chiococca* and *Chiogenes;* also *Symphoricarpos.* **S.-drop:** *Galanthus.* **S.-flake:** *Leucojum.* **S.-flower:** *Chionanthus.* **S. Glory:** *Chionodoxa.* **S.-on-the-Mountain:** *Euphorbia marginata.* **S. Pear:** *Pyrus nivalis.* **S. Tree:** *Pyrus nivalis;* also *Halesia.* **S. Wreath:** *Neviusia alabamensis.*

SOAP BARK TREE: *Quillaja Saponaria.* **S.-berry:** *Sapindus.* **S.-Bulb:** *Chlorogalum.* **S.-Plant:** *Chlorogalum.* **Soapwort:** *Saponaria officinalis.*

SOBOLÈWSKIA (named for G. Sobolewski, Russian botanist). *Cruciferæ.* Erect paniculately branched glabrous annual or biennial herbs, adapted to outdoor use: lvs. long-petioled, rotundate, coarsely crenate: fls. in corymbose racemes, slender-pedicelled, without bracts, white; sepals spreading, uniform at base: silique clavate, compressed or nearly terete, curved, leathery, 1-celled, 1-seeded.—Five species, Asia Minor and the Caucasus region.

clavàta, Fenzl. Basal lvs. reniform-cordate, the upper nearly sessile: silique 2½ lines long by 1¼ lines wide. May. Asia Minor. F. W. BARCLAY.

SOBRÀLIA (for Fr. Mart. Sobral, a Spanish botanist). *Orchidàceæ.* Extremely handsome terrestrial orchids with a very distinct habit, some of them comparing well with cattleyas and lælias in bloom.

3624. Sobralia macrantha. (×⅓)

Leaves with sheathing bases, plicate-venose: fls. membranaceous, few, in short, terminal racemes, or solitary; sepals and petals spreading; labellum convolute around the column, terminal portion large, undulate, often fimbriate, smooth or with longitudinal ridges; column slender; pollinia 8.—About 30 or more species, inhabiting the mountains of Mex. and Trop. Amer. The following account comprises the species that appear to be in the American trade, but others are to be found in the collections of fanciers. The plants have slender reed-like sts. clothed with lvs. throughout their entire length. The sts. are tufted, forming bushy plants varying in height according to the species. The fls. are among the largest of the orchids, those of *S. macrantha* attaining a diam. of 9 in. across the sepals. They are, however, very transient, fading a few days after opening.

Sobralias are charming orchids, and when room can be given to large plants they well repay the space and care they require. Many of them, to be sure, are very fugacious in their blooming, some lasting only a day, but nearly all of them make up for this by a succession of flowers which is more or less rapid. In size the individual blossoms vary from that of an ordinary *Cattleya labiata* to one scarcely 1½ inches across, and the plants themselves present as great variety, ranging from such as *S. fragrans,* which grows less than a foot high, to that giant of the tribe, *S. Cattleya,* which will reach a height of nearly 10 feet. They also give as much variety in their coloring, ranging from a shade of lavender which is almost a blue through different shades of purple to the rich claret-color of *S. Lowii,* and from yellow to the purest white. Where space for large and bushy plants can be afforded, some of the sobralias will prove most charming plants, having the double advantage of presenting in a well-grown plant not only beautiful blossoms but a subject which is thoroughly attractive as a foliage plant. They also have the added advantage of being, in most instances, of rather easy culture. Given a suitable soil and a liberal supply of water they are almost sure to grow and bloom, although they will do better if they are given their time for rest, when less water is allowed without permitting the material about the roots ever to become quite dry. (F. J. LeMoyne.)

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A. *Fls. white (see also Nos. 5 and 7).*

B. *Lip shorter than sepals, orange, center lined brown.*

1. **leucoxántha,** Reichb. f. Sts. tufted, 3 ft. high, spotted: lvs. 4–6 in. long, lanceolate, acuminate: fls. 6–7 in. across; sepals linear-lanceolate, spreading and recurved, white; petals shorter, oblong, undulate above, also pure white; labellum with a ventricose tube; limb large, circular, notched in front and the margin irregularly lobulate and wavy, throat golden yellow, with a few brownish stripes. Aug. Costa Rica. B.M. 7058. R.B. 23:205. J.H. III. 33:77; 46:331.

BB. *Lip nearly as long as sepals, yellow, center marked with orange.*

2. **virginàlis,** Cogn. Sts. up to 3 ft. tall: lvs. coriaceous, broadly lanceolate, 5–6 in. long, 1–1½ in. broad: fls. solitary, sessile, white except the yellow disk and throat; sepals revolute at apex, 3½ in. long; petals a little shorter than sepals, undulate; lip as long as petals, strongly undulate crisped. Colombia. C.O. 3. Var. **lilácina,** Cogn., has the lip tinted lilac. C.O. 3*a*.

AA. *Fls. yellow.*

B. *Lip crisped and undulate on margin; fls. 5 in. or more across.*

3. **xantholeùca,** Reichb. f. Sts. about 2 ft. high, tufted: lvs. spreading and drooping, lanceolate, 6–7 in. long, with speckled sheaths: fls. solitary, lemon-yellow, with a deeper shade on the lip; sepals linear-lanceolate, spreading and recurved; petals similar but shorter; blade of the labellum orbicular, crisp, and undulate,

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margin crenate. Guatemala. B.M. 7332. R.H. 1890: 12. G.C. III. 5:9. Gn. 22: 508. C.O. 2.—A species with fls. about as large as *S. macrantha*, but plants of more compact habit. Var. **supérba**, Hort. Fls. deeply shaded with deep cream-yellow; throat marked with orange-brown.

BB. *Lip fimbriate on margin; fls. less than 3 in. across.*

4. **frágrans,** Lindl. A small species with sts. about 1 ft. high: lvs. 1 or 2, oblong-lanceolate, 4–5 in. long: fls. 2–3 on a long peduncle, about 2 in. long, pale sulfur-yellow; sepals oblong, spreading; petals similar but erect; middle lobe of the labellum fimbriate on the margin and having many fimbriated crests. Colombia. B.M. 4882.—One of the smallest of the genus.

AAA. *Fls. chiefly purple or rose.*

5. **macrántha,** Lindl. Fig. 3624. Sts. tufted, reed-like, 4–7 ft. high, leafy all the way up: lvs. broadly lanceolate to oblong-lanceolate, long-pointed, 8–10 in. long: fls. several at the ends of the sts., rose-purple, with the front of the labellum deep purple; sepals linear-oblong, 4½ in. long, reflexed and twisted; petals broader, oblong, wavy above; labellum 5 in. long, with the expanded portion almost circular, 3 in. across and 2-lobed at the apex, very wavy; tube long, whitish within, with a yellow stain in the throat and several thin yellow ridges. May–July. Mex. and Guatemala. B.M. 4446. F.S. 7:669. P.M. 14:241 (var). G.M. 31:559. C.O. 1. O. 3:75. Var. **Kienastiàna,** Hort., (var. *álba*) has white fls. G.C. III. 48:182. Var. **álbida,** Hort. Fls. very large, creamy white. Var. **nàna,** Hort. Fls. smaller than type; lip dark violet-purple.

6. **Brándtiæ,** Kränzl. Sts. 3 ft. high: lvs. lanceolate, acuminate, 8 in. long: fls. purple-rose, paler outside, with the labellum darker and having a yellow disk; sepals linear; petals twice as wide; middle lobe of the labellum very broad, divided into 2 diverging, rather acute lobes; anther-bed with a long recurved horn on each side. Resembles a medium-sized *S. macrantha*, distinguished by the long horns of the column, and black spots (not hairs) on the lf.-sheaths. S. Amer.

7. **Fenzliàna,** Reichb. f. Sts. slender: sheaths blackish, asperulate: lvs. oblong, acutish: fls. rose-colored; sepals oblong, acute; petals obovate-cuneate, three-fourths as long as the sepals; labellum spreading, front portion ovate, notched, crenulate; horns of the column equaling the anther. Nicaragua. Var. **álba,** Hort., has pure white fls.

8. **Hólfordii,** Sander. Plants of dwarf habit: fls. rose-carmine, deeper in the lip, shading to whitish in the throat. Habitat not stated by Sander.

9. **Cáttleya,** Reichb. f. St. stout: lvs. oblong, acuminate, plaited, bearing several lateral clusters of strong, thick fls. of a firm fleshy texture, with purplish brown sepals and petals and a purplish lip, with a white column and 3 yellow lines over the center of the lip. Colombia.

10. **Lòwii,** Rolfe. An imperfectly known species intro. about 1892 from Colombia. It grows about 1½ ft. high and has fls. of a bright uniform purple.

S. Àmesiæ=S. Wilsonii × S. xantholeuca. G.C. III. 40:suppl. Aug. 25.—*S. Amesiàna*=S. Wilsonii × S. xantholeuca. G. 31:581.—*S. blánda,* Kränzl. Fls. 6 in. across, white, except throat and middle portion of disk of lip, which are golden yellow. Hab.(?).—*S. Charlesworthii,* Hort. Fls. rich rose-purple, with broad purple band around lip and bright yellow crest. Colombia.—*S. Cliftoniæ,* a dwarf, white-fld. species, said to come from Ecuador. G.M. 53: 325. J.H. III. 53:75; 63:3 (both as S. Holfordii).—*S. Còlmanii* =S. xantholeuca × S. Veitchii.—*S. Elizabethæ*=S. Liliastrum.—*S. Lindhoinei*=S. Ruckeri.—*S. Liliástrum,* Lindl. Fls. large, white, yellow-veined. Guiana, Brasil.—*S. Lucasiàna,* Hort. Fls. large; sepals and petals white; lip soft rose-purple, throat yellow. Trop. Amer.—*S. luminòsa*=S. Holfordii × S. Wilsonii.—*S. Malmquistiàna,* Schlecht. Fls. pale rose, with orange-yellow blotch on lip. Colombia. O. 1911:59, desc.—*S. murábilis*=S. Veitchii × S. macrantha Kienastiana.—*S. Rückeri,* Lind. & Reichb. f. Sepals and petals pale rose-purple; lip with a white base, marked with a yellow band, the front of lip dark rose-purple. Colombia. G.C. III. 30:67. J.H. III. 48:531.—*S. schoenbrunnénsis*=S. xantholeuca var. superba × S. macrantha.—*S. sèssilis,* Lindl. Sheaths and under surface of lvs. black-pubescent; lvs. sessile, oblong-lanceolate: fls. sessile, rose, the lip darker. Guiana. B.R. 27:17. J.F. 1:101.—*S. Siebertiàna*=S. macrantha Kienastiana × S. Hodgkinsonii.—*S. válida,* Rolfe. Fls. about 2 in. long, fragrant, whitish yellow, with deeper yellow band on lip, becoming deep orange in front. Panama.—*S. Veitchii,* Hort.=S. macrantha × S. xantholeuca. Sepals oblong, somewhat undulate, white, lightly tinted rose-lilac; petals oval-oblong, undulate, white, tinted rose; lip ample, the limb strongly tinted with lilac-violet, the throat orange, the margin strongly undulate-crisped. J.H. III. 63:171. C.O. Hyb. 1.—*S. Wiganiæ*= S. macrantha × S. xantholeuca. G.M. 45:441.—*S. Wilsonii,* Rolfe. Fls. large, white, shaded with rose and spotted with purple.

GEORGE V. NASH.†

SOCRÀTEA (named after the philosopher Socrates). *Palmàceæ.* Treated by Drude, in Engler & Prantl's "Pflanzenfamilien," vol. 2, part 3, page 60, as a subgenus of Iriartea, the subgenus characterized by the numerous stamens, the branches of the raphe which rise from the base and are united, running up to the micropyle which is at the apex of the seed.

Forgetiàna, Hort. (*Ceratólobus Forgetiàna,* Hort.). Lvs. rich green, at first entire and broadly rounded, later pinnate with the terminal lft. much larger than the others. Peru. G.C. III. 51:suppl. May 25, p. xv.; 53:286. G.M. 55:636. Gt. 61, p. 391.

SOIL. The soil is a superficial covering of the earth's crust, more or less well adapted to the growth of plants. It is usually only a few inches thick. Below this is a subsoil often differing, especially in humid climates, from the soil proper in color, texture, or chemical composition. A very striking definition has been suggested by Sir John B. Lawes, who considered the soil to be rotten subsoil, and the subsoil rotting rock. The term soil is occasionally used in a more comprehensive way to include both the soil and the subsoil.

The soil adapted to the growth of the higher plants consists of fragments of rocks or minerals, organic matter, soil solution, and a soil atmosphere. The mineral fragments vary in size from the finest clay particles to gravel and even boulders. The organic matter is derived from low organisms, from previous vegetation, or from growing plants; as also from stable manure, and occasionally fish or animal matter added to the soil by man. The soil solution consists of water carrying dissolved substances derived from the soil grains and from the organic matter, as well as from fertilizing materials artificially applied, and constitutes a nutrient solution from which the plant derives its mineral constituents. The soil atmosphere differs from the ordinary atmosphere above the soil in being richer in carbon dioxid and nitrogen, and containing more water vapor and less oxygen.

In origin there are two main classes of soils: sedimentary soils, formed by the disintegration and decomposition of rocks in place; and transported soils, including those of alluvial, glacial, and æolian origin. The word alluvial is here used to include all water-transported material; the term is, however, frequently used in a more specific sense to indicate the recent flood deposit of rivers.

Soils are classified according to their origin and their mechanical and chemical composition and properties. Genetically, they are classified according to the rock from which they are derived, as granite soil, limestone; or according to the manner of their origin, as alluvial, lacustrian, or drift. Mechanically, they are classified broadly into stony, gravelly, sandy, sandy loam, loam, clay loam, clay, adobe, black-waxy, or according to some other physical property; chemically, into calcareous, humus, alkali, and according to other striking chemical features. In the soil survey of the United States Department of Agriculture a local name is adopted for each type under which the specific characters are given; examples of this are Hartford sandy loam, Norfolk sand, San Joaquin adobe.

The physical properties of soils concern the size and

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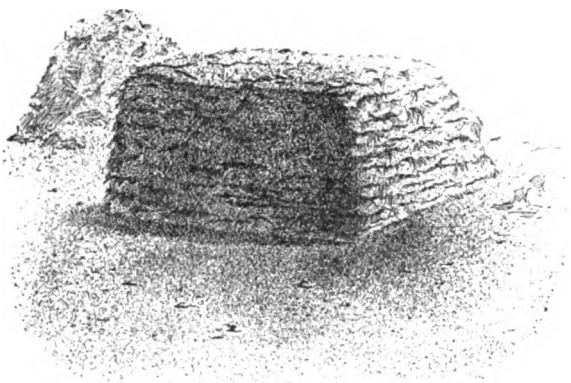
arrangement of the particles, and the relation of these to each other and to the organic matter; also the soil atmosphere, the soil moisture, and the physical forces of heat and gravitation. In these there is an intimate relation with physiography or the form and exposure of the surface of the land, as well as to climatology.

There are, undoubtedly, constant physical changes going on in the soil, as well as chemical changes, which have much to do with the best development of vegetation. The soil-moisture may be looked upon as a nutrient solution, dissolving its material from the difficultly soluble compounds in the soil and from fertilizers artificially applied. The amount of substances in solution varies with the moisture content and with the way moisture is supplied to the soil. The dissolved substances, naturally present in the soil or derived from fertilizers, influence the solubility of the soil components, rendering them more or less soluble according to their nature and existing conditions. It is probable that there is a normal weathering of the soil material which produces a certain concentration in the soil solution which will be maintained on the gradual withdrawal of nutrient material by the plant. However, this natural weathering is often not sufficient in amount to produce the yield and quality of crops desired, and this may be increased by methods of cultivation and fertilization so that crops may annually remove larger quantities of nutrient substances without any particular exhaustion to the soil.

It is certain that these nutrient materials do not accumulate to any considerable extent in soils in humid countries, as they are liable to be leached away and also to recombine, forming difficultly soluble compounds with the material of the soil-grains. A soil is in good heart or good condition when the physical conditions, such as the water-supply, soil atmosphere, and temperature relations, are favorable, and when the weathering of the material is sufficient to furnish an abundant and constant nutrient solution in the soil moisture.

One of the most potent agents in the weathering of soils is the organic material contained. This is unquestionably due largely to the amount of carbon dioxid formed, which renders many of the nutrient matters



3625. How the gardener makes his soil, by letting it decay in piles. The larger pile is composed of sods.

much more soluble. Moreover, the organic matter forms a culture medium for bacteria, ferments, and the various organized and unorganized agents which assist in breaking down the organic material, and facilitate as well the weathering of the other soil components. Soils in general have remarkable power of absorbing on the surface of the soil-grains vast quantities of carbon dioxid, ammonia, and other gases, and of other nutrient materials, which, while soluble and actually dissolved, do not readily diffuse out into the solution between the soil-grains.

The influence of fertilizers is therefore twofold: the direct addition of plant-food for the immediate use of plants, and the action of the fertilizing components upon the solubility of the otherwise difficultly soluble compounds in the soil. There are other offices which are very strikingly shown in the case of lime. This substance, when in the form of either caustic or slaked lime, corrects the acidity which is very often present in soils. It changes the structure of soils. It renders some of the soil components much more soluble, especially when the lime is in the form of the sulfate or gypsum, and it has undoubtedly a physiological rôle which enables the plant to assimilate larger quantities of other nutrient matters even in amounts which would be detrimental if the lime-salt were not present in excess.

The principal objects of the cultivation of the soil are to secure proper aëration, to conserve the moisture supply, and to improve the drainage. The irrigation and artificial drainage of soils are treated elsewhere.

The physical properties of texture and structure, that is, the size and arrangement of the soil-grains, have a greater practical importance with field crops and the relation of crops to soil under extensive cultivation than upon horticultural crops either in the field or greenhouse, where intensive methods are used. Particularly in the eastern states, where the natural rainfall is relied upon for the water supply, these physical properties have great influence in determining the relation of crops to soils. This is due in large part to the influence of the physical properties upon the water supply, and the commercial values of many soils are dependent largely upon this one condition. This is notably the case with the early truck crops, with corn, wheat, and grass lands, and with special products such as celery, cranberries, and other horticultural crops. With intensive cultivation, however, the flavor, appearance, texture, and general quality of the crop assume greater commercial importance, and even with intensive methods these are largely influenced by the character of the soil. This is shown in a striking manner in the localization of certain interests, even under the most intensive system of agriculture, such as the production of the fine lettuce around Boston, of the carnations, violets, tomatoes, and roses in other districts. With the present specialization in these lines, it is not only necessary that one should have a knowledge of the methods of cultivation, but should have the proper soil conditions as well as suitable climatic conditions; and to such an extent has this specialization been carried that different varieties of roses, for example, are best grown in different localities where the soils are slightly different. These matters must be realized by the horticulturist in order to attain the highest degree of success in any particular undertaking.

MILTON WHITNEY.

Soils for potting.

Strictly speaking, there are but two distinct kinds of soils, though there are several modifications or physical differences in both. These are mineral soils and organic soils or peat. Peat is formed in temperate climates by the accumulation of vegetable matter in swamps, or in some parts of the world under peculiar atmospheric conditions (see *Peat*). Mineral soils, which cover the greater portion of the earth's surface, are formed by the disintegration of rocks and stones through the agency of water, frost, or the atmosphere. Peaty soils are composed almost entirely of vegetable matter, with but little mineral matter. Mineral soils are just the reverse. The physical differences in peat are practically reduced to two, viz., the absence or presence of fiber. The physical differences in mineral soils vary considerably from almost pure clay to almost pure sand; indeed, the mechanical (or physical) analysis of mineral soils is based largely upon the proportions of clay and sand.

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The composition of soils can be still further known by chemical analysis, but to the average gardener this is not necessary. Moreover, it is an operation of great nicety and one that requires an experienced chemist to perform. The chemical constituents which plants derive from the soil are present in most soils, though in varying degree, but they are sure to be present in ample quantity in the potting soil selected by an experienced gardener. The air and water may furnish as much as 98 per cent of the material with which the plant body is built up in some cases, and only the remaining 2 per cent be strictly derived from the soil. Three important nutrient elements are nitrogen, phosphoric acid, and potash. Nitrogen composes four-fifths of the atmosphere and the soil absorbs it chemically through the action of bacteria when the soil is in good physical condition. Hence the importance of remembering always that air in the soil is as important as water. Sorauer, in his "Physiology of Plants," page 56, says: "The ideal condition of a soil is one in which it resembles a sponge, and in which it will retain the greatest amount of nutritive substances and water without losing its capacity for absorbing air."

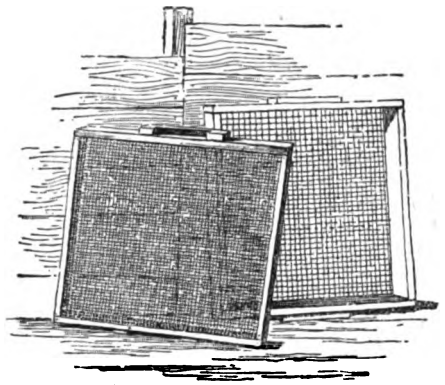
The capacity of soils to retain moisture varies considerably. A clay loam is more retentive of moisture than a sandy loam. The experienced gardener therefore selects a clay loam for his strong-rooting, large-leaved tropical plants, because transpiration is so much greater in these plants. For a general collection of greenhouse and small-growing tropical plants he selects a good loam. For cacti, agaves, and other succulent plants which will not take as much water at all seasons as other plants, he selects a sandy loam. For ferns, most of the Ericaceæ and Gesneraceæ, he selects peat; while for nepenthes, orchids, bromeliads, and the epiphytic aroids he selects fern or kalmia root. Other materials which a gardener should always have on hand when he has a large and varied collection of plants are: leaf-mold, which is made by collecting leaves and storing for at least two years, turning them over occasionally to facilitate decay; living or fresh sphagnum moss; sand; charcoal, and some convenient manures, such as pulverized sheep-manure and bone-meal.

Growing plants in pots is very different from growing them in borders or the open ground. The experienced gardener digs the turf only from good pasture or meadow land, so that it shall be full of the fibrous roots of the grass. But before using the turf for potting it should be placed in square piles, turf downward, for at least six months in order to kill the grass and all vegetable life. Fern root should also be collected and stored the same length of time in order to kill out the ferns. (Fig. 3625.) Raw and very coarse soils are usually sifted before being used for most greenhouse plants. Shallow sieves are used for this purpose. (Fig. 3626.)

Except for sowing seeds and for potting seedlings and freshly rooted cuttings, thoroughly decayed and homogeneous soils should not be sifted, but should be broken into small lumps, as the small lumps assist materially in aërating the soil. If the soil is sifted too much it becomes very fine, packs close and allows too little aëration. Leaf-mold is decayed vegetable matter, or humus. It may have little manurial value, but is used by gardeners to make soils "light" or spongy. For most young plants a good proportion added to the soil is excellent as it encourages root-growth.

Sand is the best medium for rooting cuttings of the larger number of plants. It is also added to soils to increase their porosity, especially when potting very young plants. Silver sand is best.

In potting plants, experienced gardeners make potting mixtures or add a variety of materials to the soil to suit the requirements of different plants. For young seedlings or for freshly rooted cuttings, the compost should be of a light and porous nature, but as plants increase in size and vigor a heavier and richer mixture is usually given, that is, if plants are to be grown on as specimens; but the proportion of nutrient substances used in a potting mixture should be determined by the vigor of the plants. It is always better to use too little plant-food than too much; if too much is used it often becomes available faster than the roots of plants can



3626. Sieves for sifting or riddling soils.

absorb it, often with fatal results. Many amateur plant-growers in their over-anxiety to grow fine plants make this fatal mistake.

In most gardens the greenhouse space is limited, and a gardener cannot always develop his plants to their fullest capacity or he has to reduce his variety and numbers. This, then, determines in the mind of an experienced gardener the composition of his potting mixtures. His aim should be to grow the finest possible specimens in the smallest possible pots and space.

EDWARD J. CANNING.

SOILS, STERILIZING. Greenhouse and plant-bed soils are specially liable to infection by disease organisms, as they are intensively cropped and not exposed to the action of frost and weather. Careful growers now resort to methods of artificial sterilization.

In practice, the sterilizing is accomplished either by heat applied by live steam, or by a chemical process employing a formalin drench. In either case, the work must be thoroughly performed if satisfactory results are to be expected; it will be required at least as often as every other year, and the situation is safer if sterilizing is practised annually.

Steam sterilizing is of two methods: by buried perforated pipes, and by a pan inverted over the soil and under which the steam may be conveyed. The latter is probably preferable in most cases. In either case, live steam should be applied for an hour or more.

"The perforated pipe method appears to consist, at its best," according to Selby and Humbert in Circular No. 151 of the Ohio Experiment Station, "in a system or set of perforated pipes, with crosshead and high-pressure boiler connection. These pipes are connected and buried in the soil of the bed, either with or without partial banking up of the soil; the surface of the bed is then covered with canvas or other covering and the steam passed into the system for such a period as is required to heat the soil to the necessary temperature. This temperature for best results is 180° to 212° F. maintained for a period of an hour or more. The time required to reach this temperature will vary with the boiler area, the pressure and other steam and soil factors. The length of pipes of the system will be adapted to the beds, being one-half or one-third the total length of large beds. Generally, 1½-inch pipe is used with ⅛-inch holes bored in a straight line about 1 foot apart. These pipes are buried in the beds 12 to 16 inches apart."

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For the inverted pan method, "The apparatus consists," according to W. W. Gilbert, "of a galvanized iron pan, 6 inches deep and 6 by 10 feet in size, which is inverted over the soil to be sterilized and the steam admitted under pressure. The pan is supplied with steam hose connections, has sharp edges, which are forced into the soil on all sides to prevent the escape of steam, and is fitted with handles for moving it from place to place, the weight of the entire pan being not over 400 pounds."

Remarking on the formaldehyde or formalin drench method, Selby and Humbert say that "Soils to be treated by any method of sterilization should be prepared as for use by addition of manure so that the latter is incorporated with the soil before treatment. The soil after spading or plowing is ready for treatment, whether by steaming or drenching. For the work of drenching it is rather difficult to make exact estimates as to cost of appliances, as well as labor outlay, since the appliances are the usual watering devices of greenhouses or coldframes, and the labor will be somewhat variable according to the effectiveness of these devices. The appliances used may be extremely various, though usually some form of sprinkling-can, a force pump with hose and nozzles or application through the overhead Skinner watering system. For outside beds the hose and force pump offer a convenient method. The best strength appears to be three to three and one-half pints or pounds to each fifty gallons of drench applied at the rate of seven-eighths to one gallon to the square foot of surface."

SOLÁNDRA (named for Daniel C. Solander, a Swedish naturalist and traveler, 1736–1786). *Solanàceæ*. Very tall glabrous woody showy-flowered vines suitable for the warmhouse, and grown in the open in the warmest parts of the United States.

Leaves entire, leathery, shiny: fls. very large, white; the pedicels solitary and thick; calyx long-tubular, 2–5-cleft at the top; corolla funnelform, the tube cylindrical, the throat oblique and broad-campanulate, lobes broad; stamens 5; ovary 2-celled: berry globose, pulpy. —About 4 species, Trop. Amer.

Solandras are attractive plants and their needs are simple. A warm greenhouse—one in which the temperature is never allowed to fall below 50°—will suit them very well in the eastern states. The plants would probably do well outdoors in Florida and the far South. They like plenty of light and sunshine at all seasons of the year, and water should be given freely from early autumn till the latter part of spring, as they make their growth and bloom during that period. In summer, when the wood is ripening, a dry state is preferable for them. The soil that gives the most satisfactory results is a good, somewhat sandy loam. It is unwise to disturb the roots of established plants more frequently than is necessary. The chief point in growing solandras is to obtain short, sturdy branches, for those of rank growth seldom or never develop flowers; for this reason the use of rich soils and strong fertilizers should be avoided always. Propagated by cuttings of firm young shoots taken with a heel and placed in slight bottom heat. *S. grandiflora* is perhaps the best. The flowers do not last more than four or five days. They are of a pretty greenish white color when they first open and turn slowly to a rich brownish yellow. (Michael Barker.)

3627. Solandra grandiflora. (×⅓)

A. *Plant about 2 ft. high, with trailing branches.*

longiflòra, Tussac (*S. lævis*, Hook.). Lvs. oblong-ovate or obovate, acute; petioles purplish: fls. fragrant; corolla usually 1 ft. long, 3 times as long as the calyx, contracted at the throat, white or yellowish. B.M.4345.

AA. *Plant becoming 12–20 ft. high.*

grandiflòra, Sw. Fig. 3627. Lvs. obovate-oblong, acute, glabrous, thick: fls. fragrant; corolla twice as long as the calyx, not contracted at the throat, white or somewhat yellowish. B.M. 1874. G.C. III. 21:273. Gn. 53:214. J.H. III. 34:123.

guttàta, Don. Shrub about 12 ft. high, erect, branched: lvs. alternate, petioled, elliptic-oblong, acute or very short-acuminate, entire, rather glabrous above, paler and copiously pubescent beneath, base broadened, rounded, 3–6 x 2–3 in.: fls. terminal, solitary, fragrant, ochre-yellow, large; calyx tubular, pubescent, 3 in. long; corolla funnelform, 9 in. long, 5-lobed, lobes crenate and undulate, 5 purple-brown ridges at the throat. Mex. B.R. 1551.

Hártwegii, N. E. Br. Branched shrub: lvs. alternate, glabrous, elliptical, acute, short-acuminate or obtuse, base acute: fls. solitary, terminal, yellow, 6–8 in. across; calyx 5-angled, unequally 3–4-lobed; corolla glabrous, tube 5-ribbed, ribs green outside, brownish purple inside, lobes 5, more or less crisped and turned back. Mex. G.C. III. 49:383. F. Tracy Hubbard.†

SOLÀNUM (Latin, *solamen*, solace or quieting). *Solanàceæ*. Nightshade. A vast group of temperate and tropical herbs, shrubs and even trees, comparatively poorly represented in temperate North America, of various horticultural adaptabilities, comprising ornamental subjects and also the potato, tomato, eggplant, ground cherry or physalis, red pepper or capsicum; also medicinal plants.

Leaves alternate: infl. mostly sympodial and therefore superaxillary or opposite the lvs.: corolla gamopetalous and rotate or shallow-campanulate, plaited in the bud, the limb angled or shallow-lobed; stamens usually 5, inserted on the throat of the corolla, the anthers narrower or elongated and connivent and mostly opening by an apical pore or slit; ovary usually 2-loculed, ripening into a berry which is sometimes inclosed in the persistent calyx; fls. white, purple or yellow.—Dunal, the latest monographer (DC. Prodr. 13, pt. 1), in 1852, recognized 901 species, and many species have been discovered since that time, the number now being estimated at about 1,200. Many new species have recently been described by Bitter in various volumes of Fedde, Rep. Nov. Sp. Reg. Veget. The genus finds its greatest extension in Trop. Amer. Of the vast number of species, barely 25 are of much account horticulturally, and half that number will comprise all the species that are popularly well known. One of these is the potato, *Solanum tuberosum*, one of the leading food plants of the human race. The genus seems to abound in plants with toxic properties, although its bad reputation in this respect is probably exaggerated. The species are herbs in temperate climates, but in warm countries many of them are shrubby and some are small trees. Many of them are climbers. It is impracticable to distribute the few cult. species into the various botanical groups of a great genus, and the following species are therefore assembled mainly on a

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horticultural plan. See Baker, Journ. Linn. Soc. 21, for account of the tuberiferous solanums. Other important papers on the tuberous species are Berthault, Recherches botaniques sur les varietés cultiveés du *Solanum tuberosum* et les espèces suavages de Solanum tuberiferes voisins, Ann. Sci. Agron. Ser. III. 6th année 1911; Sutton, in Journ. Linn. Soc. Bot. 38:1909; Wittmack, Berichti Deutsch. Bot. Gesellschaft 27:28, 1909, and Landwirtschaftliche Jahrbucher Zeitschrift 38: suppl. 5, 1909; Heckel, sur les Origines de la Pomme de Terre Cultiveé, etc. Ann. de la Faculté des Sci. de Marseille 16:1906; Ballivian & Tovar, Noticia Historica y Classificacion de la Papa de Bolivia. 1914.

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venustum, 36.
Wallacei, 20.
Warscewiczii, 26.
warscewiczoides, 26.
Weatherillii, 14.
Wendlandii, 37.
Worsleyi, 41.
Xanti, 19.

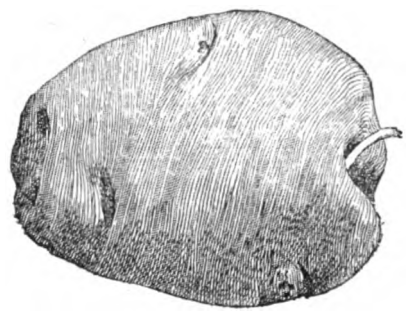
A. *Species bearing underground tubers (except No. 6): lvs. pinnate.*

B. *Corolla not deeply lobed.*

1. **tuberòsum,** Linn. POTATO. Figs. 3628, also 3152, 3153, Vol. V. Low, weak-stemmed, much-branched perennial with tender, herbaceous tops, and perpetuating itself asexually by means of thickened or tuberous underground sts., glabrous or pubescent-hirsute: lvs. unequally pinnate, the 5–9 oblong-ovate lfts. interposed with much smaller ones: fls. variable in color, white passing through various tints and shades of purple, violet, and blue, in long-stemmed dichotomous clusters: fr. a globular berry ½–1 in. or more in diam., usually through lack of viable pollen not produced in the highly developed modern varieties except in favored localities and in the case of certain varieties, but fruiting abundantly in S. Chile and in Peru. Temp. Andes of Peru and Bolivia. See *Potato*.

2. **Máglia,** Schlecht. DARWIN POTATO. Rough-hirsute branched perennial, with angled more or less winged sts. at least near the insertion of the lvs.: lvs. unequally pinnate, the terminal lft. 4 in. long, the lateral ones 2–3 pairs, elliptical, unequal at the base, acute at the apex, the interposed lfts. very small or sometimes wanting entirely: fls. in dichotomous clusters, the pedicels articulate about the middle; calyx hirsute, the lobes abruptly narrowed to a linear-acuminate point; corolla pure white, slightly lobed, the lobes acute. Infrequent along the Chilean coast from the vicinity of Valparaiso southward, and occasionally on the islands as far as the Chonos Archipelago. B.M. 6756.—Tubers gathered by the writer were about 4 in. long, dark purple, both in the skin and flesh. Apparently very difficult to hybridize with *S. tuberosum*. It was at one time considered by some to be the original of the potato. Darwin describes the plant in his "Naturalist's Voyage."

3. **Féndleri,** Gray (*S. tuberòsum* var. *boreàle*, Gray). Herbaceous perennial with st. about 18 in. high, angled, and foliage somewhat resembling the common potato: lvs. 4–5½ in. long, with 1–2 pairs of short-stalked lateral lfts., these 1¼–1¾ in. long, the terminal lft. somewhat larger, broadly ovate and abruptly rounded or subcordate at the base, acute at the apex, interposed lfts. very few, all pubescent on both surfaces with scattered hairs: fls. violet, the pedicels ½–¾in. long; calyx-lobes about 1 line long, ovate, short-acuminate; corolla about ¾–1 in. diam., the lobes pubescent without. New Mex.



3628. Tuber of potato.—*Solanum tuberosum*. (×⅓)

and probably also W. Texas, but apparently very infrequent.—The species has nothing to do with the potato and is much less frequent than the following.

4. **demíssum,** Lindl. St., both surfaces of the lvs., pedicels, and calyx pubescent with flattened hairs: lvs. 4–6 in. long with 2–3 pairs of mostly oval lateral lfts., the upper pair sometimes decurrent with the rachis, terminal lfts. much larger than the lateral ones, obovate or oval, interspersed lfts. few: fls. appearing when the plant is quite small and continuing to bloom for some time; calyx-lobes shorter than or only equaling the tube, ovate, slightly acuminate; corolla violet, ½–¾in. diam.: fr. ovoid or globose-ovoid: tubers an inch or more in diam. New Mex., Ariz. and N. Mex.—Apparently not infrequent.

5. **edínense,** Berthault. Sts. angled, rather strongly villous: lvs. unequally pinnate, the segms. unequal at the base, pubescent on both surfaces: calyx rather densely hairy with flattened hairs; corolla purple: fr. globose or slightly ovoid.—The tubers are white in the skin and flesh and after 20 years of garden cult. are reported to average 1½ in. diam. For several years this species was confused with *S. etuberosum* which apparently does not produce tubers, and from which it may easily be distinguished by the hairy calyx and larger lf.-segms. Original locality probably Chile.

6. **etuberòsum,** Lindl. Sts. 1–2 ft. high, angled: lvs. rather densely short-pubescent: pedicels about ½in. long, glabrous but peduncle pubescent: calyx-lobes nearly or quite glabrous, short-ovate, and abruptly contracted to a short acute point; corolla large, deep purple with a yellowish center. Not known to produce tubers, but may be multiplied by dividing its stout underground sts. and also grown from seed. Chile. B.R. 1712.

BB. *Corolla deeply lobed.*

7. **Jàmesii,** Torr. Low and slender, 12–18 in. tall under cult., the small angular branches glabrous or soon becoming so: lvs. oblong in general outline, the rachis narrow-winged, the lfts. 5–9, with no interposed small ones, small and lanceolate-oblong in shape: fls. small, white, the corolla deeply cleft and the anthers large and prominent: tubers few, globular, hard, 1 in. or less in diam., withstanding frost. Mountains of Colo., New Mex., Ariz., and Mex. B.M. 6766.—Sometimes cult. as a curiosity. The tubers do not appear to be eaten.

8. **Cómmersonii,** Dun. Sts. angled, sparingly pubescent or glabrate: lvs. pubescent, strongly so on the lower surface, or sometimes nearly glabrous, mostly 4–8 in. long with 2–4 pairs of lfts., the lfts. oval or slightly

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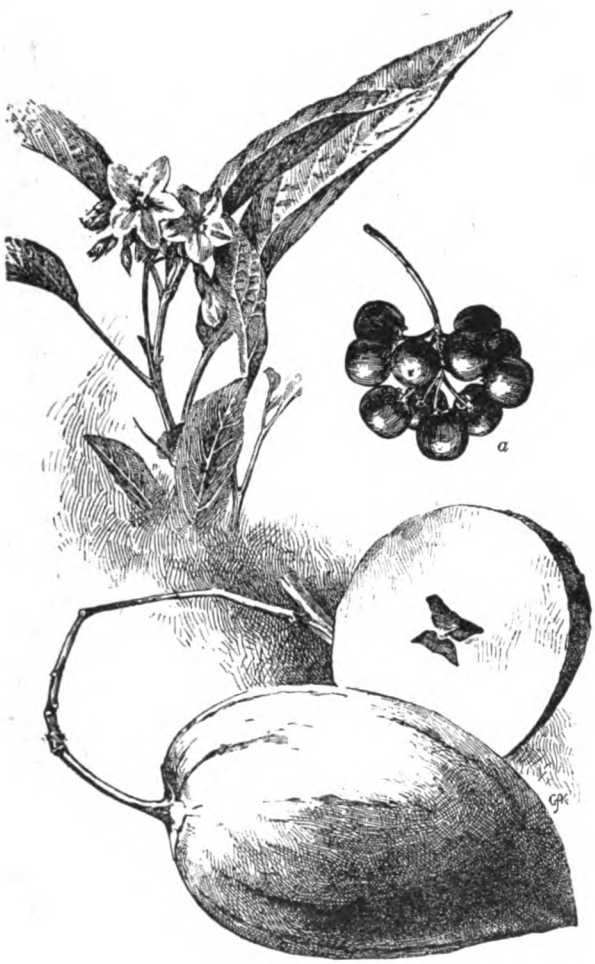
ovate, usually confluent with the rachis, obtuse at the apex, ½–1½ in. long, the terminal one somewhat larger, the upper lateral pair sometimes more or less adnate with the terminal, interspersed lfts. very few or none: calyx slightly pubescent, the lobes ovate-acute, about a line long; corolla white or pale violet, rather deeply lobed, pubescent on the outer surface, rather strongly so toward the apex of the lobes. E. Argentina and Uruguay, usually in moist situations. Trans. Hort. Soc., vol. 5: t. 10.—Of no value in the improvement of the common potato. See suppl. list, p. 3186.

AA. *Species grown for the edible frs.: lvs. simple.*

9. **nigrum,** Linn. BLACK NIGHTSHADE. MORELLA of the French. Low unarmed herbaceous annual or suffrutescent in warm climates, glabrous or the young parts sometimes sparingly pubescent: lvs. simple, ovate,



3629. Two solanums.—Pepino, or melon shrub, Solanum muricatum; and garden huckleberry, S. nigrum var. guineense, at *a*. (Both ×½)

narrowed at both ends, entire or more frequently sinuate-toothed, petioled: fls. small, white, in pedunculate lateral cymes; calyx much shorter than the corolla with small obtuse lobes; corolla about ½in. diam.: berry globular, black, about ¼in. diam. A widely distributed weed in all temperate and tropical regions.—In the Dakotas, according to Hansen, the plant is often called "stubbleberry," as it volunteers freely in wheat-stubble, and the fr. is used there for pies and preserves. Hansen finds that the plants withstand considerable frost. In warm countries, according to Vilmorin, the lvs. are sometimes eaten as spinach is, "and apparently without any injurious result, although the plant belongs to the dangerous family of the Solanaceæ." The species is extremely variable, and much difference of opinion exists in regard to the poisonous qualities of the berries. Possibly differences exist in this respect in different forms but not correlated with characters recognizable by the systematist. Var. **guineénse,** Linn., with scarcely angled to angular smooth st., broadly ovate lvs. glabrous above and glabrous or sparingly pilose below, deeply lobed calyx and relatively large fr., is the "garden huckleberry" (Fig. 3629). This form is cult. to some extent in some sections and the fr. used for pies and preserves. Another form, *S. Burbankii,* bitter, with foliage rather dark green above, and erect or ascending peduncles, is stated by the originator to be a hybrid between the "garden huckleberry" and *S. villosum* of the Pacific coast. In some characters it appears to be intermediate between its supposed parents, and it is used as is the former.

10. **muricàtum,** Ait. (*S. guatemalénse,* Hort.). PEPINO. MELON PEAR. MELON SHRUB. Fig. 3629. An erect spineless bushy herb or subshrub 2–3 ft. high, the branches often with rough warty excrescences, and usually glabrous or nearly so: lvs. entire or with slightly undulate margins, rarely ternate, oblong-lanceolate, or ovate, tapering to the more or less margined petiole and also toward the more or less obtuse or sometimes acute apex, the surface sparingly soft-pubescent: fls. in a long-stalked cluster, rather small, the corolla bright blue, deeply 5-lobed, puberulent on the outer surface, inclined or nodding: fr. ovoid or egg-shaped, long-stalked, drooping, yellow overlaid with splashes of violet-purple, 4–6 in. long when cult., flesh yellow and seedless under cult. Said to be a native of Peru and cult. in other parts of Trop. Amer. at temperate elevations. G.F. 5:173. G.C. III. 3:309.—This plant attracted some attention in this country about 25 years ago. It appears to have been intro. into the U. S. from Guatemala in 1882 by Gustav Eisen. A full review of the history and botany was made in Cornell Exp. Bull. No. 37 (1891). The fr. is aromatic, tender, and juicy, and in taste suggests an acid eggplant. In a drawer or box, the fr. may be kept till midwinter. In the N. the seasons are too short to allow the fr. to mature in the open, unless the plants are started very early. The pepino is properly a cool-season plant, and when grown in pots in a cool or intermediate house will set its frs. freely. It is readily prop. by means of cuttings of the growing shoots. The plant will withstand a little frost.

11. **Melóngena,** Linn. (*S. insànum,* Linn.). Erect and much-branched herb or subshrub, 2–3 ft. tall, woolly or scurfy, spiny: lvs. large and heavy, ovate or oblong-ovate, becoming nearly glabrous above but remaining densely tomentose beneath, shallowly sinuate-lobed: fls. large, mostly in clusters, the calyx woolly and often spiny, the spreading, deeply lobed, purplish corolla 1 in. or more across: fr. a large berry. Afr. and S. Asia. Original habitat probably S. W. Asia.

Var. **esculéntum,** Nees (*S. esculéntum* and *S. ovigerum,* Dun.). COMMON EGGPLANT. GUINEA SQUASH. AUBERGINE. Figs. 1379–1381, 1383, Vol. II. Cult. for its large frs., which are usually oblong, obovoid, or egg-shape in form, and purple, white, yellowish or striped: differs from the wild plant in having fewer spines, mostly solitary fls., and much larger and more variable frs. There are 2 well-marked subvarieties: var. **serpentínum,** Bailey. SNAKE EGGPLANT. Fr. greatly elongated and curled at the end. Var. **depréssum,** Bailey. DWARF PURPLE EGGPLANT. Fig. 1382. Low and diffuse, many of the branches finally resting on the ground, usually dark-colored, nearly glabrous and always spiny: lvs. small and relatively thin, less lobed: fls. small and longer stalked: fr. purple, pyriform. See *Eggplant.*

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AAA. *Species grown wholly for ornament or curiosity.*

B. *Habit erect, the plant either herbaceous or woody.*

C. *Plant without spines, the lvs. entire or merely undulate (except sometimes in No. 15).*

D. *Foliage entirely glabrous.*

12. **aviculàre,** Forst. (*S. laciniàtum,* Ait.). A leafy unarmed soft-wooded glabrous shrub 4–8 ft. high, with spreading branches, smooth or marked with raised lines decurrent from the petioles: lvs. variable in size and shape, 4–12 in. long or sometimes even longer, lanceolate or linear-lanceolate, entire or irregularly pinnatifid and the lobes linear or lanceolate and acute: fls. in cymose clusters in the axils of the upper lvs. or lateral; calyx-lobes broad and obtuse, with an abrupt point; corolla violet, ¾–1 in. diam., the lobes short and broad: fr. a broad ovoid edible berry ¾–1 in. long, yellowish. New Zeal.; also common in many parts of Austral., Tasmania, and in Norfolk Isl. B. M. 349.

3630. Solanum Pseudo-capsicum. (×½)

13. **glaùcum,** Dun. (*S. glaucophýllum,* Desf.). A perennial plant 6 ft. or more high, with round erect sts., suckering abundantly: lvs. 5–6 in. long, ¾–1½ in. broad, ovate-lanceolate to oblong-lanceolate, entire, narrowed toward the base and decurrent with the petiole, acuminate at the apex, the surface glabrous and somewhat glaucous: fls. in terminal and lateral branched racemes or corymbs; corolla blue, star-shaped, about 1 in. diam., the lobes ovate: berry small, ovoid-globose, yellow. Province of Buenos Aires in Argentina, and in S. Brazil. B.M. 7945.

DD. *Foliage more or less pubescent, at least on the lower surface (except in No. 15).*

E. *Fls. small, less than ½in. diam., white.*

14. **Pseudo-cápsicum,** Linn. JERUSALEM CHERRY. Fig. 3630. A small branching leafy shrub, reaching 3–4 ft., erect and glabrous throughout: lvs. narrowly lanceolate, oblanceolate, or oblong, entire or the margins slightly wavy, narrowed at the base to a short petiole, mostly obtuse at the apex, the surface bright green and shining, the veins prominent: fls. solitary or few in lateral clusters, small, white: fr. globose, scarlet or rarely yellow, ½–¾in. diam. Widely distributed in tropical and semi-tropical regions, naturalized in Fla. Probably a native of the Old World, perhaps Madeira. —An old-fashioned plant usually grown as small specimens in pots for its showy scarlet frs., which persist for a long time. Var. **nânum,** Hort., is a dwarf compact form. Var. **Wéatherillii,** Hort., Weatherill's hybrid, is a form with strongly veined undulate lvs. and pointed orange-colored frs.

15. **Héndersonii,** Hort. Very like *S. Pseudo-capsicum,* but the white fls. very numerous, and the fr. ovoid or olive-form, orange-red. A horticultural form, perhaps a hybrid. Also known as *S. hýbridum Héndersonii,* but not related to the plant known in Old-World gardens as *S. hybridum.*

16. **Capsicástrum,** Link. Fig. 3631. A small shrub resembling the last but only 1–2 ft. high: st. more or less pubescent, with stellate hairs or glabrate: lvs. simple, oval, oblong, or sometimes slightly ovate, narrowed toward the petiole, obtuse at the apex, the margins entire or slightly undulate, the upper surface green and somewhat pubescent, the lower more strongly so: fls. small, white: fr. ½in. diam., orange-red or scarlet. Brazil and Uruguay. F.S. 12:1242. G.W. 3:529.—Frequent greenhouse and window-plant. Var. **Mélvinii,** Hort., a compact form 12–15 in. high with ovoid berries. Var. **variegàtum,** Hort., has variegated lvs.

EE. *Fls. usually ¾in. or more diam., violet or rarely white in No. 22.*

17. **Rantonnétii,** Carr. (incorrectly spelled *S. Rantònnei, Rantònni,* etc.) (*S. mùticum,* N. E. Br. *S. japónicum,* Hort.). An erect bushy grayish green half-shrub, growing 3–5 ft. high, the st. marked with raised lines decurrent from the petioles: lvs. entire, lanceolate or ovate-lanceolate, narrowed to the petiole, mostly acute at the apex, glabrous or inconspicuously pubescent on the upper surface, pubescent with short hairs below: fls. 2–5, together in the axils, 1 in. or more diam.; calyx-lobes with an abrupt linear point, corolla violet with a light yellow center: the red fr. nearly or quite 1 in. diam., heart-shaped, drooping, and very ornamental. Margins of woods in Paraguay and Argentina. Cult. in warm temperate regions of Amer. and Eu. R.H. 1859, p. 135. Gt. 43:1401.—An excellent plant for blooming in the open in summer. Easily prop. by means of cuttings.

18. **críspum,** Ruiz & Pav. An unarmed shrub, or sometimes attaining the size of a small tree, with rather long green flexuous branches puberulous when young, later becoming glabrous: lvs. 3–4 in. long, entire, thin, ovate to ovate-lanceolate, subcordate at the base, acute at the apex, smooth above, the margins somewhat undulate and the nerves prominent on lower surface: corymbs many-fld., corolla pale violet, about ¾in. broad and twice as long as the calyx, the lobes ovate or ovate-lanceolate: fr. globose, pale yellow, about the size of a pea. In Chile from the central provinces to the Island of Chiloe, also in Peru. B.M. 3795. G.C. III. 30:424.

19. **Xânti,** Gray. A low shrub or at high elevations herbaceous from a woody base, the sts. slender, 1–2 or even 3 ft. high, the younger ones angled, somewhat villous with many-celled usually gland-tipped simple hairs: lvs. membranous, ovate, ovate-oblong to oblong-lanceolate, ½–1¾in. long, wedge-shaped, rounded or subcordate at the base, entire or lobed: fls. in umbel-like cymes, corolla ½–1 in. diam., rotate, angular or short-lobed, violet: fr. erect, berry-like, globose, light green or purplish in color. Throughout Calif., except in the desert region, ascending to 6,500 ft. altitude. B.M. 7821.

20. **Wállacei,** Parish. A shrubby plant often forming round masses and reaching a height of about 3 ft., the sts. densely villous with long many-celled tawny viscid hairs: lvs. rather thick, usually less densely hairy than the sts., the lower rather large, cordate, the upper ovate, rounded or subcordate at the base: fls. in rather large forked cymes, corolla 1–1½ in. diam., pale violet: ripe fr. dark purple. Islands off the coast of Calif.,

3631. Solanum Capsicastrum. (×½)

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Low. Calif., and near the seacoast in Cent. Calif. The *S. Xanti* var. *Wallacei* of Gray.

21. **umbelliferum,** Esch. (*S. californicum*, Dun.). A densely villous rarely glabrate shrub. lvs. entire, usually obovate or oblong, rarely oval or ovate, ½–1 or 2 in. long: fls. in umbel-like terminal clusters; corolla pale violet or sometimes white, pubescent on the outer surface, ¾in. diam., showy and fragrant: berry large, purple. Calif.—The plant offered as *S. umbellatum* is very likely this species.

CC. *Plant more or less spiny, the lvs. sinuate or lobed.*

D. *Lvs. pinnately lobed.*

E. *Species perennial.*

22. **aculeatissimum,** Jacq. (*S. ciliatum*, Lam. *S. myriacanthum*, Dun.). An undershrub 1–2 ft. high, st. branched, furnished with many long straight spines, interspersed in the younger parts with stiff bristles: lvs. solitary or geminate, broadly ovate or ovate-cordate, pinnately 5–7-lobed, 4 in. long, 3 in. wide, with rigid adpressed hairs on both surfaces, and spines on the upper surface of the principal nerves; petiole 1 in. long: cymes extra-axillary, few-fld.; calyx-lobes triangular, closely beset with spines; corolla rotate, 1 in. diam., snow-white, the lobes lanceolate: fr. globose, 1–2 in. diam., glabrous, orange or orange-yellow, flattened on the ends, corrugated. Widely distributed in tropical regions. F.S. 19:1988. F.M. 1871:521. R.B. 20, p. 249. R.H. 1888, p. 78.

EE. *Species annual.*

23. **citrullifolium,** A. Br. (*S. heterodoxum*, Brit., not Dun.). An annual plant armed with straight prickles, glandular pubescent with mostly simple hairs: lvs. 1–2-pinnatifid, the lobes obtuse and repand: infl. racemose, corolla violet, nearly 1½ in. diam., somewhat irregularly 5-cleft, the lobes ovate-acuminate, anthers unequal, 4 of them yellow, the larger one tinged with violet: fr. inclosed in the prickly calyx. W. Texas and New Mex.

3632. Solanum integrifolium.—A species grown for its ornamental fruit. (×⅙)

24. **sisymbriifolium,** Lam. (*S. Balbisii*, Dun.). An annual plant with many yellow- or orange-colored spines covering the st., both surfaces of the lvs., petioles, and sepals, and the upper part usually somewhat villous with gland-tipped hairs: lvs. oblong or ovate, sinuately lobed or even deeply pinnatifid and the lobes sinuate or deeply cut: infl. terminal or soon lateral, racemose, the fls. rather numerous, light blue or white and 1 in. or more diam.: fr. globose, red, 1 in. or more diam., surrounded by the at length ovate-lanceolate calyx-lobes. Trop. Amer. and naturalized in waste grounds in the Gulf states. B.M. 2828; 3954. G.C. III. 45:61.

25. **cornutum,** Lam. (*S. Fontanesianum*, Hort.). An annual herbaceous simple-stemmed spiny plant 1–4 ft. high: lvs. oval or ovate, pinnately lobed and the lobes again sometimes divided nearly to the center, the divisions oblong, acute, or rounded at the apex and tipped with an abrupt point, pubescent on both surfaces, that on the lower stellate: fls. terminal, in clusters of 3 or 4, corolla yellow, about 1–1¼ in. diam., villous on the outside, anthers uneven, the fifth ½–¾in. long and twice the length of the other 4, enlarged at the base and shaped somewhat like a horn, hence the name: fr. small, spiny. Mex.

DD. *Lvs. sinuately lobed.*

E. *The lvs. rusty-tomentose at least on the lower surface.*

26. **Warscewiczii,** Hort. (*S. warscewiczoides*, Hort.). Strong erect suffrutescent plant, reaching a height of about 6 ft., usually with a central st., densely rusty-tomentose and armed with many short stout hooked or straight greenish yellow spines: lvs. large, sometimes the blade a foot or more long, rather soft green and slightly pubescent at least along the veins above, grayish or rusty below and with dense stellate pubescence or tomentum, oval, somewhat cordate at the base and rather deeply lobed with unequal lobes: infl. at first terminal, later lateral in 1-sided corymbiform racemes with numerous fls.; calyx deeply lobed, the segms. oval and long-acuminate, spiny or unarmed, covered with numerous whitish hairs; corolla white, about 1½ in. diam., the lobes lanceolate and acute: fr. pale yellow, glabrous and shining. Probably S. American. R.H. 1865, p. 430; 1896, p. 237.—A very striking plant for subtropical gardening and can easily be raised from seed in a single season; half-hardy perennial.

27. **alatum,** Seem. & Schmidt (*S. robustum*, Wendl.). Vigorous more or less spiny densely tomentose herb or subshrub, the sts. winged, 3–5 ft. high: lvs. decurrent with the spiny petiole, sometimes 1 ft. long, broadly ovate or ovate-elliptic in outline, sinuately lobed, the lobes acute, upper surface green and tomentose-velvety, woolly with more or less rusty tomentum beneath: fls. in axillary racemes, calyx unarmed, corolla about 1 in. across, white, with ovate-lanceolate acute lobes: fr. globular, small, hairy, orange-colored. Brazil. R.H. 1863, p. 250; 1896, p. 236.—Bold species, useful for subtropical gardening.

EE. *The lvs. with gray or whitish pubescence.*

F. *Fls. white.*

28. **integrifolium,** Poir. (*S. coccineum*, Hort. *S. Lobelii*, Tenore). CHINESE SCARLET EGGPLANT. ORNAMENTAL EGGPLANT. ETHIOPIAN EGGPLANT. Fig.

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3632. Coarse, bushy herb, 3 ft. tall, scurfy-tomentose, armed with strong hooked spines: lvs. much like those of the eggplant but the lobes sharper, spiny on the midrib and petiole: fls. small, white, in clusters of 2–6: fr. 1–2 in. across, mostly flattened on the ends but sometimes nearly globular in outline, prominently lobed, bright scarlet or yellow. Probably African.—An old-time garden plant, but little grown. Annual.

29. **marginàtum,** Linn. f. A shrub 3–4 ft. high: st. terete, covered with white stellate tomentum: spines subulate, those on the upper part ⅜–¾in. long, on older parts 1 in. long: lvs. ovate, pinnately lobed less than half-way to the midrib or the upper ones undulately lobed, subcordate at the base, coriaceous, 3–7 in. long, 2–5 in. wide, covered with fine white stellate pubescence which in age disappears from the upper surface except near the margin, remaining silvery white beneath; spines on the principal veins often 1 in. long: cymes extra-axillary, subumbellate; pedicels covered with white stellate tomentum; calyx spiny, the lobes narrow and acute, corolla broadly campanulate, 1¼ in. diam., white with the center and midrib bluish: fr. globose, 1½ in. diam., spiny, shining yellow and drooping. Nile Land, Abyssinia. Naturalized to a slight extent at Montecito near Santa Barbara, Calif. B.M. 1928.

FF. *Fls. blue or violet.*

G. *Size of lvs. large, 10–15 in. long.*

30. **macrânthum,** Dun. (*S. maroniénse,* Poit). A shrub 6 ft. or more high, with yellowish brown straight prickles: lvs. 10–15 in. long, narrowed at the base to short winged petioles or sometimes subcordate, ovate, lanceolate or lanceolate-elliptic, sinuate-angled or lobed, pale on the lower surface with stellate pubescence, dense on the younger lvs.: fls. in simple or branched racemes 3–5 in. long and 7–12-fld.; corolla bluish violet, 1½–2½ in. diam., the lobes acute. Brazil. B.M. 4138.

31. **macrophýllum,** Hort. An erect more or less stellate pubescent plant with curved spines: lvs. large, a foot or more long, unequal at the subcordate base, sinuate-lobed, the lobes oblong-lanceolate, acute, repand-undulate, petioles about 1 in. long, decurrent with the st.: infl. racemose; calyx-lobes with a long attenuate point; corolla large, blue, marked with yellow in the center: berry globose, yellowish, about ⅜in. diam. Mex. G. 2:283.

GG. *Size of lvs. smaller, 5–7 in. long.*

32. **Tórreyi,** Gray. Strong perennial herb, with close grayish stellate pubescence, prickles small and few along the st. and midribs of the lvs. or sometimes nearly wanting: lvs. 4–6 in. long, ovate with truncate or slightly cordate base, sinuately 5–7-lobed, the lobes entire or undulate, obtuse, unarmed: infl. at first terminal, cymose, 2–3-fld.; lobes of the calyx short-ovate with an acuminate point; corolla 1½–2 in. diam., pale blue, the lobes broadly ovate: fr. globose, smooth, 1 in. diam., pale yellow at maturity. Kans. to S. Texas. B.M. 6461.—It survives the winters at Cambridge, Mass., and spreads by running underground shoots.

33. **pyracánthum,** Jacq. An erect spiny plant with woody st. 3 ft. tall: lvs. 5–6 in. long, short-petioled, oblong, acute, deeply lobed and the lobes oblong, entire, obtuse, tomentose, spiny along the midvein: fls. numerous, in lateral racemes sometimes 6 in. long; corolla blue: fr. globose, glabrous, nearly ½in. diam. Probably Afr. Hort. Schoenb. 4:36. t. 470.

34. **índicum,** Linn. A much-branched prickly undershrub sometimes reaching a height of 8 ft., densely clothed when young with stellate tomentum, the prickles compressed, stout, and sometimes recurved: lvs. ovate, sinuate or lobed, 3–6 in. long and 1–4 in. broad, stellate woolly beneath and prickly along the nerves: racemes lateral, many-fld.; fls. blue, calyx-lobes in fl. triangular, acute, very woolly, unarmed, or with slender straight spines, these becoming stronger in fr., corolla ¾–1 in. diam., lobes broadly triangular, tomentose without, less so within: berry yellow or scarlet, glabrous, about ½in. diam. Very common in Trop.

3633. Solanum Wendlandii. (Much reduced.)

India and China, Malaya, and the Philippines. Doubtfully in the American trade.

BB. *Habit of plant climbing, more or less woody, spineless (except No. 38).*

C. *Foliage entirely glabrous.*

35. **jasminoides,** Paxt. POTATO VINE (from the fls.). Fine greenhouse twining shrub, reaching several feet in height, glabrous: lvs. rather small, the upper ones lanceolate to lance-ovate and entire, the lower ones of about 3 narrow, ovate entire lfts.: racemes short and united into a cluster 3 in. or less long and about 8–12-fld.; fls. about 1 in. across, star-shaped, white with tinge of blue; pretty. S. Amer. P.M. 8:5. B.R. 33:33. Gn. 43, p. 433; 45, p. 162; 50, p. 19; 51, p. 358; 53, p. 28. —A most useful deciduous climber for the coolhouse, and much grown. Half-hardy, and useful for the open in the S. Will grow 10–20 ft. if given a chance. Var. **grandiflórum,** Hort., has very large trusses of fls. and is a robust grower; excellent. Gng. 1:259. Var. **variegàtum,** Hort., has variegated foliage.

36. **Seaforthiànum,** Andr. (*S. azùreum,* Hort., not Fern. *S. venústum,* Kunth). Beautiful slender unarmed herbaceous or slightly woody climber or trailer, with st. 3–4 ft. long, glabrous throughout: lvs. with 3 lfts., these 1½–2 in. long, or the upper ones simple, lanceolate, or ovate-lanceolate with entire or undulate margins: fls. numerous, in long drooping axillary panicles, on pedicels swollen at the apex, the corolla light purple or blue, star-shaped and usually 1 in. or less diam.: fr. ovoid or nearly globose, glabrous, scarlet. Brazil. B.M. 1982; 5823. B.R. 969. R.H. 1893, p. 177; 1897:424.—A very beautiful plant for the coolhouse. Begins to bloom when very young. Var. **álbum,** Hort., a variety with white fls. recently intro.

37. **Wéndlandii,** Hook. f. (*S. Wéndlandii magnificum,* Hort.). Fig. 3633. Tall-climbing, glabrous, with a few scattered prickles: lvs. various, sometimes 10 in. long, the uppermost simple and oblong-acuminate, the others lobed or trifoliolate and with the terminal lft. much the largest, all with entire margins: fls. in large cymes, pale lilac-blue, the corolla 2½ in. across and shallow-lobed: fr. globose. Costa Rica. B.M. 6914. G.C. III. 14:339.

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G.M. 36:610. A.F. 12:1147. F.E. 8:828.—A splendid greenhouse climber, perhaps the most showy of the cult. solanums. Blooms in summer and fall. Ernest Braunton writes: "*S. Wendlandii* is a magnificent climber in this climate (Los Angeles), reaching 50 ft. or more and having umbels 12 in. across. It is perhaps the showiest vine in Calif. when in bloom. It is generally hardy here, although some winters nip and even kill the vine in the colder and lower parts of this city. Cut up an old vine, any kind of wood, stick the pieces in sand or light soil, and wait. Every cutting will grow. When in a robust condition it is a gross feeder. It should be in full sun, though it does well anywhere."

3634. Solanum Dulcamara. (×¼)

cc. *Foliage usually more or less pubescent, sometimes glabrous or glabrate.*

38. **Dulcamàra,** Linn. BITTER-SWEET. Fig. 3634. A more or less pubescent or sometimes glabrous shrubby climber with st. 4–6 ft. long: lvs. entire or sometimes 3–5-parted, 1–3 in. long, the entire ones cordate, ovate-cordate, or the upper ones hastate: fls. many, drooping, in panicled corymbs opposite the lvs.; corolla white or violet, ½in. diam., the lobes reflexed, each segm. furnished with 2 greenish spots near the base: fr. ovoid, ½in. diam., red or rarely yellowish green. Naturalized from Eu.

39. **jasminifòlium,** Sendt. St. round, unarmed, sparingly pubescent or glabrate: lvs. ovate to ovate-lanceolate, entire or very slightly undulate, usually subcordate at the otherwise truncate base, acute or obtuse at the apex, petiole ½–1 in. long, the blade 1–2 in. long: fls. several in a paniculate cluster; calyx campanulate, the lobes about equaling the tube, oblong and obtuse; corolla about ¾in. across, deeply lobed, the lobes ovate or oval. Brazil.

40. **pénsile,** Sendt. A woody climber, more tender than *S. Wendlandii:* lvs. simple and entire, 2–4 in. long, somewhat glossy green and glabrous above, paler below, ovate or slightly cordate at the base, rarely narrowed toward the petiole: fls. in long panicles or racemes, the corolla purplish red changing to pale blue with white star-shaped center, rather deeply lobed and about 1 in. diam.: fr. globose, pale violet, about the size of a small cherry. British Guiana, the Amazon region and Surinam.

41. **Wórsleyi,** Hort. An unarmed woody climbing plant reaching a height of about 9 ft.: lvs. soft-pubescent, oblong-lanceolate, drooping, 6–12 in. long: frs. the size of a hen's egg, clear light red in color; is a native of the highlands near Rio de Janeiro, Brazil, where it is used for the decoration of dwellings. In the unripe stage the frs. are said to be prepared and used as a vegetable. G.C. III. 27:19.

S. auriculàtum, Ait., is allied to S. verbascifolium, and is sometimes mistaken for it. Lvs. 6–7 in. long, ovate-oblong, acuminate, entire, velvety-tomentose above with branched hairs, more densely so and paler below, axils furnished with small lvs.: corymbs subterminal, many-fld.; corolla violet, about ½in. across: berry globose. Afr.—*S. betàceum,* Cav., is Cyphomandra, for which see Vol. II.—*S. cérnuum,* Vellos. Shrub or small tree, with cyphomandra-like lvs. and the young parts clothed with chaffy hairs: fls. white: fr. globose, hairy, inclosed in the calyx. S. Brazil. B.M. 7491.—*S. Cómmersonii,* "Violet," which attracted much attention a few years ago, is S. tuberosum, being similar to, if not identical with the variety known as "Blue Giant."—*S. corymbòsum,* Jacq. A fetid rather weak, unarmed, branched half-shrub: lvs. 2–5 in. long, glabrous except for the ciliate margins, ovate or lanceolate, entire or slightly lobed: fls. about ½in. diam., blue or violet: fr. reddish orange, ¼–⅓in. diam. Native of Peru.—*S. erèctum* is Cyphomandra betaceum.—*S. Pierreànum,* Paill. & Bois, has fr. the size of a walnut and shaped like a tomato, scarlet.—*S. stoloníferum,* Schlecht. & Bouché. Tuber-bearing: lvs. with 3–4 pairs of pinnæ, the interposed ones very numerous; lfts. mostly subcordate at the base and acuminate at the apex, sparingly pubescent with scattered flattened hairs on the upper surface, usually only along the veins on the lower surface, but puberulent on both surfaces: calyx glabrous, the lobes about the length of the tube; corolla white.—*S. tubingénse* and *S. Darwiniànum* said to be graft hybrids of Lycopersicum esculentum and S. nigrum produced by Prof. Winkler of Tubingen. G.C. III. 50:161.—*S. verbascifòlium,* Linn. Lvs. lanceolate-ovate, or ovate-oblong, entire, tomentose, without smaller lvs. in the axils: fls. rather small, white: fr. the size of a small cherry. Widely distributed in the tropics. W. F. WIGHT.

SOLDANÉLLA (Latin, *a small coin,* referring to the shape of the leaves). *Primulàceæ.* Small glabrous perennial herbs with short rhizomes, hardy and useful in the border or rock-garden.

Leaves long-petioled, thick, cordate-orbicular or reniform, entire: scapes slender, solitary or few, 1-fld. or many-fld., umbellate: fls. blue, violet, or rose, rarely white, nodding, about ½–¾in. across; calyx 5-parted, segms. lanceolate, persistent; corolla hypogynous, funnelform-campanulate, 5-lobed to the middle, the lobes laciniate-lacerate; ovary superior, ovoid: caps. conic-oblong, many-seeded.—Species, 6, mountains of Eu. For account of species and cult., see Gn. 61, pp. 126, 127; for monograph, Paxt. & Knuth in Das Pflanzenreich, hft. 22 (IV. 237).

Soldanellas are amongst the most famous flowers of the Alps, though not the commonest. *S. alpina* ascends the mountains to the line of perpetual snow. Grant Allen, in "Flashlights on Nature," declares that the flower of soldanella actually thaws its way up through a solid block of ice. Soldanellas are cultivated in this country only in a few rock-gardens. Those who have limited resources and dwell in the region of changeable winters might attempt to grow these plants in pots under a frame in lieu of nature's winter covering. They are said to prefer a half-shady or shady position and are propagated by seed or division.

A. *Fls. 2–4 on a scape; corolla split half-way to the base; filaments half as long as anthers.*

B. *Pedicels pubescent.*

montàna, Mikan. Sts. 6–14 in. high: lvs. roundish; margin slightly and remotely crenate: fls. violet. May–July. Gn. 61, p. 127. G.W. 15, p. 714.

BB. *Pedicels roughish.*

alpina, Linn. (*S. Clùsii,* F. W. Schmidt. *S. occidentàlis,* Vierh.). Fig. 3635. Sts. 3–6 in. high: lvs. roundish; base more or less kidney-shaped; margin entire or somewhat wavy: fls. violet, with darker streaks. May. B. M. 49: 2163. G.C. II. 24:457. G. 34:469. Gn. 61, p. 127. Var. **álba,** Hort., is a white-fld. form. Natural hybrids are known of which this species is one of the parents. Pyrenees, Alps, etc. Handsome species.

3635. Soldanella alpina. (×½)

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CV. Solidago ulmifolia, one of the common goldenrods.

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AA. *Fls. solitary; corolla split a third of the way to the base; filaments about as long as anthers.*

B. *Pedicels roughish.*

pusílla, Baumg. Sts. 3–6 in. high: base of lvs. heart-shaped or kidney-shaped; margin somewhat wavy: fls. copper-colored, verging on blue, the fringes straight, not spreading. May. Gn. 61, p. 126. Var. **álba,** Hort., is a white-fld. form. G.C. III. 55:224. Gn. 78, p. 172.

BB. *Pedicels pubescent.*

mínima, Hoppe. Sts. 3–4 in. high: lvs. roundish: fls. pale lilac, streaked purple inside; the fringes spreading at the tips. June, July. Gn. 61, p. 126. Var. **álba,** Hort., is white-fld. form. *S. Gánderi,* Huter, is a hybrid of *S. alpina* and *S. minima.* WILHELM MILLER. F. TRACY HUBBARD.†

SÒLEA: *Hybanthus.*

SOLENÁNTHUS (Greek, *tube* and *flower*, referring to the form of the corolla). *Boraginàceæ.* Gray-villous hirsute or rarely glabrous perennial herbs, hardy and suitable for border planting: lvs. alternate: racemes sometimes elongated and simple, sometimes short, scorpioid, densely-fld., and numerous in terminal panicles: fls. blue or rose; calyx 5-parted, segms. narrow; corolla tubular or funnelform, 5-lobed, the lobes small, obtuse; ovary 4-lobed, distinct: nutlets 4, depressed.—About 20 species, S. Eu., W. Asia, and Russia.

apenninus, Hohen. (*Cynoglóssum apennìnum,* Linn.). Plant hardy, 2½–3 ft. high: lvs. rather coarse, the radical ovate-oblong, those of the st. long-lanceolate: fls. blue, forget-me-not-like, in dense, axillary, panicled racemes. May, June. S. Eu.—A useful plant amongst shrubbery or in the back part of borders. Prop. by division or seed.

SOLENÍDIUM (Greek, *tube,* and *appearance,* in allusion to the shape of the fl.). *Orchidàceæ.* Epiphytic herbs with abbreviated sts. terminated by 1–2-lvd. pseudobulbs, occasionally grown in the warmhouse: lvs. rather long, thin-leathery: scape simple, axillary from below the pseudobulb: fls. in a lax raceme, medium-sized and long-pedicelled; bracts small; sepals subequal, free, spreading; petals similar to the sepals; labellum spreading at the base of the column, contracted to a long claw, dilated at the tip, undivided; column erect, broadly 2-winged, the wings spreading above into auricles and united with the membranaceous variously toothed or lobed clinandrium; pollinia 2: caps. not known.—One species in the Colombian Andes, *S. racemòsum,* Lindl. About 6 in. high: st. shortened: lvs. rather long, ensiform, thinly coriaceous, narrowed at the base: fls. yellow, spotted with red; sepals and petals free. Nov. J.F. 4:349. Cult. like oncidium.

F. TRACY HUBBARD.

3636. Solidago cæsia.

3637. Solidago speciosa.

SOLENOSTÈMON (Greek, *tube* and *thread,* referring to the fact that the filaments are grown together, at their base, into a tube). *Labiàtæ.* Erect herbs allied to Coleus, probably similarly used: lvs. ovate, crenate, long-petioled: whorls of fls. laxly 6- to many-fld., arranged in long racemes or panicles: fls. small; calyx ovoid-campanulate, upper tooth ovate with decurrent edges, lateral small, lower oblong, as long as the upper; corolla-tube exserted, slender, dilated and oblique at the throat, the limb 2-lipped, upper shorter, lower long, oblong, slightly concave; stamens 4, the filaments united at their base into a tube; disk glandular: nutlets ovoid, smooth.—Eight species, W. Trop. Afr.; one also occurs in Brazil.

Godefròyæ, N. E. Br. (*Còleus Godefròyæ,* Godef.-Leb.). Herb, up to 2 ft. high, branches 4-angled: lvs. opposite, green, paler beneath, ¾–1¼ in. long, very wide-ovate or deltoid-ovate, base truncate or cuneate-truncate, slightly crenulate: racemes terminal, spike-like; fls. blue; calyx subequally 2-lipped; corolla, basal portion of tube, abruptly upcurved, upper portion abruptly deflexed, flattened-dilated, upper lip very short, crenately 4-toothed, lower lip compressed sideways. Trop. Afr. B.M. 8511. F. TRACY HUBBARD.

SOLIDÀGO (according to Gray, from "*solidus* and *ago,* to make solid or draw together, in allusion to reputed vulnerary properties"). *Compósitæ.* GOLDENROD. Perennial herbs very useful for borders and for colonizing, but little known in the trade.

Erect, of various habit, with simple alternate lvs. and many small yellow (rarely whitish) heads in spikes, thyrses, compound panicles, or racemes: heads oblong or narrow-campanulate, with small mostly appressed scales, containing few florets, the disk-florets all perfect and the ray-florets in one series and pistillate: pappus of 1 or 2 rows of roughish capillary bristles.—The genus is characteristic of E. N. Amer., where about 60 species occur. There are several species on the Pacific coast, a few in Mex. and S. Amer., and 2 or 3

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in Eu. and N. Asia, making, altogether, perhaps 130 species. A very few of the important species may be described here; for others, the current botanical manuals should be consulted.

Amongst the glories of the American autumn are the asters and goldenrods. They complement each other. The asters run in cyanic colors, goldenrods in xanthic, —the blue and blush on the one hand and the yellow and golden on the other. Because the goldenrods are so common, they have not been appreciated for planting. They improve in the garden, however, the plants becoming larger and the bloom fuller and richer. They present few difficulties in cultivation. They may be transplanted from the wild with the greatest ease, and the stools may be lifted and divided as soon as they become root-bound and show signs of failing. Some of them become weedy if the soil is very rich. The solidagos are variable, even within the same species. Therefore it is well to mark fine individual clumps when in bloom, for removal in late autumn or early spring. The observation of a single season should result in a fine collection of individual plants. A very attractive grouping of asters and goldenrods can be made entirely of native species:

3638. Solidago canadensis.

3639. Solidago nemoralis.

3640. Solidago rugosa.

with a background of sumac, the autumnal colors of which are beautifully harmonized by the blues and purples of the asters and the yellows and cream-yellows of the goldenrods.

A. *Heads in small axillary clusters, not usually in large terminal infl.*

cæsia, Linn. WREATH GOLDENROD. Fig. 3636. A smooth slender perennial, often glaucous, simple or sometimes branched: lvs. stalkless, acuminate, the base narrowed, sharply toothed, 2½–3½ in. long: fls. in axillary racemes or head-like clusters, yellow or sometimes whitish: involucral bracts obtuse. E. N. Amer. Aug.–Oct.—Useful as a partial shade plant or in the open border.

AA. *Heads in a large terminal infl. which is not composed of 1-sided clusters of fls. (secund).*

B. *Lvs. serrate.*

speciòsa, Nutt. Fig. 3637. Stout, smooth, usually simple-stemmed perennial, smooth below, often rough above: lvs. glabrous, firm, the basal 3–6 in. long and ¾–1½ in. wide, diminishing in size above, crenate, pinnately veined: heads in a large showy terminal thyrsus, the branches of which are ascending and often leafy: bracts of the involucre oblong, very blunt. Rich soil, E. N. Amer. A.G. 13:583. G.F. 3:561 (adapted in Fig. 3637).—Excellent for half-shady border.

BB. *Lvs. entire or essentially so.*

Virgaùrea, Linn. EUROPEAN GOLDENROD. A rough simple-stemmed but stout perennial 1–3 ft. high: basal lvs. 4–7 in. long, 2–2½ in. wide, obtuse or acute; upper lvs. sessile or narrowed into margined petioles: fls. in a dense terminal, rather narrow and often interrupted thyrsus which is often 8–10 in. long: bracts of the involucre acute or acutish. Eu. G. 27:7.—One of the best garden plants of the group. A prostrate form is offered. *S. cámbrica,* Huds., is a compact and dwarf form, 6 in. or less high, with larger heads. *S. Virgaurea* is represented in the U. S. by *S. Cútleri,* Fern. (*S. Virgaùrea* var. *alpìna,* Bigel.), in the highest alpine districts of N. New England and N. Y.; this American species appears not to be in the trade.

AAA. *Heads in a terminal infl., usually a panicle, which is composed of 1-sided branches or clusters (secund).*

B. *Foliage fragrant; lvs. pinnately veined.*

odòra, Ait. SWEET GOLDENROD. A slender, simple-stemmed, anise-scented perennial about 18–24 in. high: lvs. dotted, quite entire, acute or acuminate, 2½–4 in. long, lanceolate: fls. in a small, not very showy cluster, but persisting many weeks; tips of the involucral bracts acute. E. U. S.—Good for dry sandy open places. July–Sept.

BB. *Foliage not fragrant; lvs. triple-nerved, with a pair of lateral veins beside the midrib.*

C. *Lower lvs. lanceolate, sharply serrate.*

canadénsis, Linn. Fig. 3638. St. 3–5 ft., stout, hairy and usually much branched: lvs. acute at each end, the lower sharply serrate, lanceolate, 3–7 in. long, ¾–1½ in. wide, the upper smaller and often entire: fls. in a very large terminal secund panicle, involucral bracts linear, obtuse or acutish. In dry soil, E. N. Amer.—There are many wild forms but none seems to be in the trade. Aug.–Nov. This is a coarse and somewhat weedy species; very common.

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cc. *Lower lvs. oblanceolate, merely crenate or entire.*

nemorâlis, Ait. Fig. 3639. St. slender, hairy, 18–24 in. tall: lvs. thick, roughish, the lower petioled, oblanceolate, crenate; upper lvs. becoming smaller, linear-oblong, acutish and entire: fls. in a 1-sided panicle, not very large or showy; bracts of the involucre linear-oblong, obtuse. In dry open places, E. N. Amer.—Aug.–Oct. Good for the sunny border and the fls. usually very persistent.

BBB. *Foliage not fragrant; lvs. pinnate-veined, rough.*

rugòsa, Mill. Fig. 3640. Stout erect mostly stiff plant, to 7 ft., hairy: lvs. crowded above, lanceolate to ovate-lanceolate, sharply serrate, more or less rugose: heads in a broad pyramidal panicle, closely arranged on one side of the curving branches. Canada and U. S.

Any number of Solidagos may be offered in lists, but they are scarcely trade commodities. *S. Bùckleyi*, Torr. & Gray, N. C. to Ala., is a plant described as 2 or 3 ft. high, with ovate-oblong to oblong-lanceolate lvs., and heads in a loose and elongated thyrse; the name is listed abroad, the plant said to be "suitable for rock-garden, later summer-flowering, yellow, 1 ft."—*S. flexuòsa, S. gigantèa, S. lævigàta*, are also listed, but the writers do not know what plants pass under these names in cult.—*S. sempérvirens*, Linn. A maritime fleshy-lvd. smooth plant, tall and stout, 2–4 ft. and more: lvs. entire, lanceolate to lance-oblong: heads in short racemes which are disposed in a panicle. Atlantic seaboard of the U. S.—*S. spectâbilis*, Gray. Plant 1–2½ ft. tall: lvs. lanceolate to linear, the lower oblong or more or less spatulate and sparingly serrate: heads golden yellow, numerous and crowded in a thyrse. Nev. to Calif.

L. H. B.
N. TAYLOR.

SÓLLYA (in honor of Richard Horsman Solly, 1778–1858, an English botanist). *Pittosporàceæ*. Evergreen climbing subshrubs, ornamental greenhouse plants and hardy outdoors in the South.

Leaves narrow, entire or rarely sinuate: fls. nodding, at the ends of the branches, in lax, few-fld. cymes or rarely 1-fld., blue; sepals small, distinct, petals obovate, spreading from the base; anthers connivent in a cone around the ovary; ovary subsessile, perfectly 2-celled: berry oblong, indehiscent.—About 3 species, Austral. Prop. by cuttings in sand under glass, or by seeds, which germinate readily.

heterophýlla, Lindl. AUSTRALIAN BLUEBELL CREEPER. Fig. 3641. Small shrub, 2–6 ft. high, with slender, twining sts.: lvs. variable, from lanceolate or oblong-linear to ovate-lanceolate, or ovate-oblong, obtuse or slightly acuminate, entire, 1–2 in. long, usually narrowed into short petioles: cymes 4–8–12-fld., terminal or lf.-opposed: fls. bright blue, ⅓–½in. long. July. B.M. 3523. R.B. 21:253. B.R. 1466.—Hardy and much cult. in Cent. Calif. and a great favorite on account of the brilliant blue of its fls. Especially valuable for covering banks, rockwork, and low fences, preferring to scramble over other plants. Also grown as an herbaceous border plant, being kept within bounds by the shears. The roots are very attractive to the California pocket-gopher, who plays sad havoc with it if not watched. Sometimes seen in greenhouses.

parvifòra, Turcz. Much more slender and twining than *S. heterophylla*, usually loosely soft-hairy: lvs. lanceolate or oblong-linear, the larger about 1 in. long, very short-petioled and thinner than the preceding: fls. small, solitary, or 2–3 in a cyme; pedicels filiform: berry ½–¾in. long, tapering at both ends. W. Austral.

Drúmmondii, Morr. St. weak, flexuous-twining to the left, prostrate, pubescent: lvs. alternate, linear-lanceolate, both ends acute, scarcely petioled, nerves pilose: cymes 2-fld. or the fls. solitary, terminal; peduncles rather glabrous: fl. nodding; sepals linear, villous. Austral. B.H. 4:33. F. TRACY HUBBARD.†

SOLOMON'S SEAL: *Polygonatum.* False S. S.: *Smilacina.*

SÓNCHUS (the Greek name). *Compósitæ*. Mostly weedy plants, but some of the Canary Island species are good foliage subjects.

Annual or perennial, usually more or less succulent, sometimes frutescent, leafy-stemmed, mostly smooth and glaucous, summer-flowering: lvs. usually clasping entire, toothed or runcinate-lobed or even pinnatifid and laciniate, more or less prickly-margined: heads homogamous and ligulate, yellow-fld., with more or less imbricated involucral bracts, becoming thickened or tumid at base, corymbose or paniculate: achenes ribbed or costate, not beaked, with fine white pappus. —Species 40 or more, in the Old World, some of them intro. in N. Amer. as weeds.

Certain bold foliage plants of this genus are more or less listed and mentioned abroad, the botanical identity of which is to be determined. *S. arbòreus laciniàtus* described as a "magnificent foliage plant with laciniated lvs.," is probably a form of *S. pinnâtus*, Ait., which grows 3 ft. or so high, bearing glabrous pinnately parted lvs. with narrow entire or toothed lobes, native of Madeira. What is mentioned abroad and also in S. Calif. as *S. Jácquinii*, is probably *S. congéstus*, Willd., described as a beautiful foliage plant with long and broad crowded recurved oblanceolate more or less pinnatifid lvs. (1 ft. or less long and 2–3 in. broad) and showy panicles of yellow heads 2–3 in. across; Canary Isls., where it is known as pastor's lettuce (lachuza de pastor), perhaps in allusion to availability of the lvs. for salad. The lvs. of other species of Sonchus are said sometimes to be similarly used. The names *S. elegantíssimus* and *S. laciniàtus* sometimes appear in horticultural literature, representing ornamental plants with much-divided lvs., the segms., very narrow; they are probably forms of Canary or Madeira species. L. H. B.

3641. Sollya heterophylla. (×½)

SONERÌLA (adapted from a native name). Syn., *Cassebeèria*. *Melastomàceæ*. Herbs or small shrubs of various habit, with ornamental foliage, suitable for the greenhouse.

Leaves similar or dimorphous, often membranaceous, entire or serrulate, 3–5-nerved: fls. in scorpioid racemes or spikes, frequently rose, rather large or some small; calyx glabrous or setose, tube turbinate, oblong or campanulate, 3-lobed, the lobes short; petals 3, ovate, obovate, or oblong; stamens 3 (rarely 6, the alternate ones smaller); ovary adherent or almost so to the tube of the calyx, 3-celled: caps. included in the turbinate, cylindrical, ribbed or 3-angled tube of the calyx, 3-valved.—About 75 species, India and the Malay Archipelago. This includes a number of dwarf tender foliage plants which must be grown in the greenhouse all the year round. The plants belong to the same cultural group with Bertolonia, Gravesia, and Monolena, and are distinguished by having their floral parts in 3's. The fls. are usually rose-colored, ½in. across or less, and generally disposed in scorpioid racemes or spikes. The species described here are all caulescent plants with lvs. distinctly petioled, those of each pair being of equal size (except in *S. maculata*): fls. 3-merous; stamens 3, long-acuminate.

It was long thought impossible to grow sonerila and its allies outside of a bell-jar or Wardian case. Gardeners now dispense with the "double glass" and

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grow these plants in tropical or even temperate greenhouses. For potting material they use a compost of fibrous peat and chopped sphagnum, sprinkled with sand and interspersed with bits of charcoal. The plants should have a partially shaded position, and should never be syringed. Never allow water to remain on the leaves. The species seed freely. The varieties are propagated by division.

Sonerilas thrive best in a close and moisture-laden atmosphere with just enough ventilation to keep them from melting or decaying. A temperature of not less than 75° suits them best. Cuttings of well-ripened growth are placed under a glass case or bell-glass in a bottom heat of 70° to 80°. Care must be taken every morning to allow the drops of condensation which gather on the glass to dissipate. For potting material use fine-screened leaf-mold, with plenty of silver sand intermixed and a little finely chopped fresh sphagnum on the top of the pots or pans. These plants have shallow roots, and require plenty of drainage, consisting of fine broken potsherds mixed with either charcoal or finely ground soft-coal clinkers. When the plants have made their full growth (which they do if started at the proper time in early spring) they start into flower. At this time the plants should be hardened off by gradually withholding water, and they should also be kept a little cooler. When fully ripened they may be cut back in order to furnish material for cuttings. Keep the old stools a little warmer and they will gradually start into new growth again. These plants make choice decorative plants in pans or even in wire baskets and can be used for choice table or mantel decorations. (H. A. Siebrecht.)

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KEY TO THE SPECIES.

A. *Foliage not variegated*..... 1. **speciosa**
AA. *Foliage variegated.*
B. *Calyx with rather long and sparse glandular hairs.*
C. *Margins of lvs. ciliate*..... 2. **maculata**
CC. *Margins of lvs. not ciliate*..... 3. **læta**
BB. *Calyx glabrous or rarely dotted-scurfy.*
C. *Number of nerves 7: margin of lvs. minutely serrate*..... 4. **picta**
CC. *Number of nerves 9 or 7: margin of lvs. sharply and prominently serrate.*
D. *Color of nerves dark purple: lvs. covered with short, dark purple hairs*..... 5. **orientalis**
DD. *Color of nerves green: lvs. glandular-pubescent, the pubescence not purplish.*
E. *Lvs. with a dark green ground, and pearl-like spots of regular size and arrangement*... 6. **margaritacea**
EE. *Lvs. with a dark green ground, and irregular light-colored blotches between the veins*..... 7. **Hendersonii**
EEE. *Lvs. silvery, only the nerves dark green*..... 8. **argentea**

1. **speciòsa,** Zenker. This is practically the only species cult. for its fls.: height 1 ft.: lvs. opposite, cordate-ovate, green above, sometimes crimson beneath, mostly 7–9-nerved: fls. purple or rose, 4–14 in a cluster, 1 in. across. India. B.M. 4978 (as *S. elegans*); 5026. F.S. 23:2442.

2. **maculàta,** Roxbg. This differs from the other species here described in having lvs. of unequal sizes. The larger one of each pair may be 3–5 in. long; the smaller a half or third as long: lvs. ovate or oblong, unequal at the base, minutely denticulate, 9–11-nerved: fls. violet. India. R.H. 1865, p. 91, is too poor to determine.—Probably not in cult.

3. **læta,** Stapf. Erect herb, 6 in. high: st. terete, glandular-puberulent: lvs. petioled, ovate or elliptic-ovate, symmetrical or a little asymmetrical, not ciliate-margined, the larger lvs. up to 4 x 2 in., green but white-spotted above, purple and green-spotted beneath: cyme terminal, contracted, 7-fld.; calyx oblong-cylindrical, purple; petals oblong, subacuminate. China.—Closely related to *S. maculata.*

4. **pícta,** Korth. Erect or ascending, with scurfy or puberulous branches: lvs. short-petioled, broadly lanceolate, wedge-shaped at the base, minutely serrate, 7-nerved, lined with white along the primary nerves: fls. rosy. Sumatra.—*S. picta* of the trade is probably *S. orientalis* var. *picta.*

5. **orientàlis,** Lind. The botanical status of this name is doubtful. In horticulture it applies to a group of varieties sent out by Wm. Bull in 1891, and remarkable for two novel features: some of the varieties have dark purple or bronzy colors; others are peppered all over with an infinite number of small, light-colored dots. All have dark purple nerves. G.W. 6, p. 327. In I.H. 37:113 the lvs. are shown as ovate, acuminate, more or less cordate and unequal at the base, with 9 or 10 nerves, entire: color of fls. not recorded. Habitat not stated. The typical form is said to have bronzy lvs. with an amaranth reverse. Var. **guttulàta,** Hort., has green lvs. peppered with small white dots and is pale green below. Var. **punctàta,** Hort., is much like the preceding variety but has paler lvs. Var. **pícta,** Hort., has purplish lvs. of the type, with an irregular lanceolate strip of silvery gray down the middle. Var. Robert Sallier, R.B. 20:61, has dark green lvs. peppered white and with a lanceolate figure of silver down the middle. Said to be a hybrid of vars. *picta* and *punctata.* It has the stripe of one and the dots of the other.

6. **margaritàcea,** Lindl. This is the most important species. The name "margaritacea" means "pearly," referring to the regular rows of pearly spots between the nerves and parallel with them, which are characteristic of the typical form. Lvs. ovate-lanceolate, acutely serrate, 7–9-nerved, glabrous, purplish below, acute at the base: fls. rosy. B.M. 5104. F.S. 11:1126 (nerves too parallel). I.H. 2:40. G.W. 6, p. 326. H.F. II. 4:72. Lowe 16.—Supposed to be native of Java. In Vol. II, edition 1, page 684, *Gravesia guttata* var. *margaritacea* is erroneously referred to Sonerila instead of Salpinga. *Salpinga margaritacea* is readily told from *Sonerila margaritacea* by its 5-nerved lvs. and floral parts in 5's.

7. **Héndersonii,** Hort. (*S. margaritàcea* var. *Héndersonii,* Hort.). This is referred by Cogniaux to *S. margaritacea,* of which it is perhaps merely a horticultural variety. For trade purposes it is convenient to treat it like a distinct species. It seems to be the chief parent in the development of the numerous hybrids with blotched foliage. It differs from the type in having a broader lf. with a shorter acumen and rounded base, and especially in being covered with irregular blotches, which, however, do not cross the nerves. F.M. 1875: 159. I.H. 23:230. G.W. 2, p. 285. G.Z. 19:161.—The blotches are all about the same size. **S. Màmei,** Lind., has more regular and roundish blotches, which are nearer white and on a darker ground, the under side netted with rosy purple. I.H. 23:254.

8. **argéntea,** Hort. (*S. Héndersonii* var. *argéntea,* Fournier). For horticultural purposes this may be treated as a distinct species, characterized by its silvery foliage, resembling that of certain begonias, with no dark green except on the nerves. This is the parent of most of the forms that have a silvery cast of foliage, just as *S. Hendersonii* is responsible for the irregular blotches. G.W. 6, p. 325.

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A very handsome hybrid between the orientalis and margaritacea groups is called Mme. Paul du Toict. It has the serrate lf. and some of the silveriness of S. argentea, with the numberless minute dots of the S. orientalis group. It is much like Robert Sallier, but the central coloring is bronsy as well as silvery and more broken up by the green.

S. marmordta and *S. picturdta* of the trade are not accounted for botanically.

WILHELM MILLER.
F. TRACY HUBBARD.†

SÓPHORA (*Sophera*, Arabian name of a tree with pea-shaped flowers). Including *Styphnolòbium* and *Edwárdsia*. *Leguminòsæ*. Ornamental woody or rarely herbaceous plants grown chiefly for their attractive flowers and handsome foliage.

Deciduous or evergreen useful ornamental plants: lvs. alternate, odd-pinnate with opposite usually small entire lfts.: fls. pea-like, in racemes or terminal leafy panicles; calyx with 5 short teeth; standard orbicular or broadly obovate; stamens 10, free or connate only at the base: pod stalked, almost terete or 4-winged, rarely compressed, few- to many-seeded, moniliform, indehiscent or tardily dehiscent.—About 25 species in the temperate and subtropical regions of both hemispheres. The fls. and frs. of *S. japonica* yield a yellow dye, *S. tomentosa* has medicinal properties, and the seeds of *S. secundiflora* contain sophorine, a poisonous alkaloid. *S. tetraptera* is a valuable timber tree in its native country.

The sophoras are handsome trees, rarely shrubs or herbs with graceful foliage, evergreen in some species, and with papilionaceous whitish, violet or pink, or yellow flowers in terminal panicles or in racemes, followed by long and narrow moniliform pods. *Sophora japonica* and the shrubby *S. viciifolia* are hardy as far north as Massachusetts, while *S. affinis* is less hardy. The evergreen species are tender and can be grown only in the southern states and California; they are very showy in spring when they are in bloom; in England they are often planted against a wall, where they can be easily protected against light frost. *S. japonica* is especially valuable for its late-appearing flowers, which are white and disposed in ample panicles; the foliage is dark green and graceful and the tree is conspicuous in winter on account of its dark green branches. It is sometimes planted as a street tree, as it stands heat and drought well. The sophoras thrive best in well-drained sandy loam but grow fairly well in rather dry soil. Propagation is by seeds and the varieties by grafting on the typical form; some species are also increased by greenwood cuttings and by layers.

3642. Sophora viciifolia. (×⅓)

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A. *Fls. white, violet, or pink.*

B. *Lfts. ½in. long, or less: spinescent shrub.*

1. **viciifòlia,** Hance (*S. Dàvidii*, Komarov. *S. Moorcroftiàna* var. *Dàvidii*, Franch.). Fig. 3642. Spinescent shrub, to 6 ft., with slender spreading pubescent branchlets: lvs. 1–1½ in. long, short-petioled; lfts. 11–15, sessile, elliptic, obtuse, and mucronulate, pubescent beneath, ¼–½in. long: fls. bluish violet or nearly white, about ½in. long, in short, 6–12-fld. racemes terminal on short branchlets; calyx shortly 5-toothed,

3643. Sophora japonica. (×¼)

violet; petals of nearly equal length; standard spatulate-obovate, reflexed: pod about 2 in. long, slender, long-beaked, glabrous. June, July. Cent. and W. China. B.M. 7883. A.F. 29:155. G.C. III. 36:3. Gn. 68, p. 87; 78, p. 469. Gng. 16:3. G.W. 11, p. 139.—Graceful shrub; has proved quite hardy at the Arnold Arboretum.

BB. *Lfts. larger: unarmed trees.*

C. *Fls. in large terminal panicles.*

2. **japónica,** Linn. (*Styphnolòbium japónicum*, Schott). JAPAN PAGODA TREE. Figs. 3643, 3644. Tree, attaining 60 ft., with spreading branches, forming a dense round head: lvs. 7–9 in. long; lfts. 7–17, distinctly stalked, ovate to ovate-lanceolate, acute, rounded at base, dark green and glossy above, more or less pubescent beneath, 1–2 in. long: fls. yellowish white, ½in. long, in loose panicles 15 in. long: pod distinctly stalked, glabrous, terete, 2–3 in. long, ⅓in. broad. July–Sept. China; cult. in Japan. Gn. 24, pp. 210, 211, 214; 29, p. 222; 73, p. 43. G.M. 38:665. Gng. 6, p. 247. M.D.G. 1898:183. F.E. 12:1174. G.W. 8, p. 615; 12, p. 200; 13, p. 243. Var. **péndula,** Loud. Figs. 3645, 3646. With long and slender pendulous branches. R.H. 1876:194, 195 (adapted in Figs. 3645, 3646). Gn. 9. pp. 600, 601; 24, pp. 202, 203, 211; 28, p. 27. M.D.G. 1898:182. G. 6:257. Gn.M. 2:106. G.C. III. 28:479. F.E. 14: 1430, pl. 43. Var. **columnàris,** Schwerin. Of narrow pyramidal habit. Var. **violàcea,** Carr. (*S. violàcea*, Dipp., not Thwaites). Lfts. 15–17, sparingly pubescent above, densely so beneath, acute: fls. with pinkish lilac wings and keel, standard white.—The plants cult. as *S. tomentòsa*, *S. sinénsis*, and *S. Korolkòwii* also belong to this species. The first, which is not to be confused with *S. tomentosa*, Linn. (see suppl. list), has 15–19, smaller and broader, elliptic lfts. densely pubescent beneath, less so above; the second has pale pink fls. and 11–17

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ovate to ovate-oblong lfts. soft-pubescent beneath; the third has larger oblong-lanceolate lfts. broadly cuneate at the base and slightly pubescent beneath. There is also a form with variegated lvs.

CC. *Fls. in racemes.*

D. *Foliage deciduous: racemes axillary.*

3. **affínis,** Torr. & Gray. Small round-headed tree, with slender branches, to 20 ft.: lfts. 13–19, elliptic,

3644. Pod of Sophora japonica. (×1)

obtusish or emarginate, broadly cuneate at the base, glabrous or with scattered hairs below, conspicuously veined, 1–1½ in. long: fls. ½in. long, white tinged with rose, with the lvs. in axillary nodding racemes 3–5 in. long: pod terete, moniliform, more or less pubescent, ½–3 in. long, black. Spring. Ark., Texas. S.S. 3:122.

DD. *Foliage evergreen: racemes terminal.*

4. **secundiflòra,** Lag. Small tree, 35 ft. high, with short, slender trunk and upright branches forming a narrow head or shrubby: lvs. 4–6 in. long; lfts. 7–9, elliptic or obovate-oblong to oblong, rounded or emarginate at the apex, cuneate at the base, silky-pubescent while young, dark yellowish green above, 1–2½ in. long: fls. violet-blue, the standard marked near the base with a few dark spots, very fragrant, about 1 in. long, in 1-sided racemes 2–3 in. long: pod white-tomentose, terete, 1–7 in. long, ½–¾in. thick; seed bright scarlet. Spring. Texas to New Mex. S.S. 3:121. R.H. 1854:201.—On account of its handsome fragrant fls., to be recommended for planting South.

AA. *Fls. yellow, in axillary racemes: lvs. evergreen.* (*Edwardsia.*)

B. *Pod 4-winged: fls. about 1½ in. long.*

5. **tetráptera,** Ait. (*Edwárdsia tetráptera,* Poir.). Shrub or small tree, 30, rarely 40 ft. high, with slender spreading branches: lfts. very numerous, almost sessile,

3645. Sophora japonica var. pendula, in winter.

obovate to linear-oblong, silky-pubescent: fls. in 2–8-fld. racemes, pendulous, about 1½ in. long: pod 4-winged, 7 in. long. Spring. New Zeal., Lord Howe Isl., Juan Fernandez, Chile. G. 29:185.—The following varieties are in cult.: Var. **grandiflòra,** Hook. f. (*Edwárdsia grandiflòra,* Salisb.). Lfts. linear-oblong, obtuse, appressed silky-pubescent on both sides, about 1 in. long, in 10–25 pairs: fls. 1⅔ in. long; standard shorter than wings. B.M. 167. G.C. II. 9:729. Gn. 24, p. 211; 76, p. 292. L.B.C. 12:1162. G. 5:593; 10:445. Var. **microphýlla,** Hook. f. (*S. microphýlla,* Ait. *Edwárdsia Macnabiàna,* Curt.). Lfts. orbicular-obovate to broadly oblong, usually emarginate, glabrous or nearly so above, sparingly pubescent beneath, sometimes only on the midrib, ¼–½in. long: fls. about 1½ in. long; standard about as long as wings. B.M. 1442; 3735. G. 34:503, 505. Gn. 24, p. 211. Gn. 12:87 also seems to belong here.

6. **chrysophýlla,** Seem. (*Edwárdsia chrysophýlla,* Salisb.). Tree, to 30 ft.: lfts. 13–21, obovate-oblong or oblong, obtuse, tawny or grayish pubescent beneath, less so above, rarely glabrescent, ½–1 in. long: fls. pale yellow, about 1 in. long; standard slightly shorter than wings: pod 4-winged, 4–6 in. long. Hawaiian Isls. B.R. 738.

3646. Sophora japonica var. pendula, in summer.

BB. *Pod not winged: fls. ¾–1 in. long.*

7. **macrocárpa,** Smith (*Edwárdsia chilénsis,* Miers). Shrub or small tree, with the young branchlets densely tomentose: lfts. in 10–20 pairs, elliptic or obovate obtuse, silky-pubescent beneath, ¾–1 in. long: fls. ¾–1 in. long, in short racemes; standard as long as wings: pod terete, not winged, 1–4-seeded. Chile. L.B.C. 12:1125. B.R. 2798.

S. alopecuroides, Linn. Grayish-pubescent undershrub, with upright, virgate branches: lvs. 6 in. long, with 15–25 oblong lfts.: fls. yellow: racemes dense, terminal, about 6 in. long: pod terete, 6–12-seeded. W. Asia to Himalayas. Half-hardy.—*S. austràlis,* Linn.=Baptisia australis.—*S. platycárpa,* Maxim.=Cladrastis platycarpa.—*S. tomentòsa,* Linn. Pubescent shrub: lvs. 6–10 in. long; lfts. 15–19, oval to oblong, obtuse, 1–1¾ in. long: fls. yellow, in terminal 6–12-in. long racemes: pod 4–6 in. long. Southern states, W. India. B.M. 3390. Not hardy North.

ALFRED REHDER.

SOPHROCATLÆLIA (compounded from *Sophronitis, Cattleya,* and *Lælia*). *Orchidàceæ.* A name to designate the hybrids between the genera Sophronitis, Cattleya, and Lælia.

SOPHROCÁTTLEYA (compounded from *Sophronitis* and *Cattleya*). *Orchidàceæ.* A group established to contain hybrids between Sophronitis and Cattleya.

Sophrocáttleya Batemaniàna=S. grandiflora × C. intermedia. Gn.W. 4:809.—*S. Blàckii*=S. grandiflora × C. Hardyana.—*S. Chámberlainii triúmphans*=S. grandiflora × C. Harrisoniana.—*S. eximia*=S. grandiflora × C. Bowringiana. Gn. 72, p. 5.—*S. Heàthii*=S. grandiflora × C. Schroederæ.—*S. Impératrix*=S. grandiflora × C. Mossiæ.—*S. Marriottiàna*=S. grandiflora × C.

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aurea.—*S. Nýdia*=S. grandiflora × C. columnata.—*S. Sáxa*=S. grandiflora × C. Trianæ.—*S. schoenbrunnénsis*=S. cernua × C. Bowringiana.—*S. Thwàitesii*=S. grandiflora × C. Mendelii. J.H. III. 58:295.—*S. warnhaménsis*=S. grandiflora × C. amethystoglossa. G.M. 49:547.—*S. Wéllesleyæ*=S. grandiflora × C. labiata. G.M. 57:207.—*S. westfieldénsis*=Sc. eximia × C. labiata.

GEORGE V. NASH.

SOPHROLÆLIA (compounded from *Sophronitis* and *Lælia*). *Orchidàceæ*. A group-name to comprise hybrids between Sophronitis and Lælia. *S. Gratrixiæ*=L. tenebrosa × S. grandiflora. G.M. 50:683.—*S. heatonénsis*=L. purpurata × S. grandiflora. G.M. 45:698.—*S. Marriottiàna*=following.—*S. Marrióttii*=L. flava × S. grandiflora. G.C. III. 27:66.—*S. Órpetii*=L. pumila × S. grandiflora.—*S. Ortoniàna*=L. Diana × S. grandiflora.

GEORGE V. NASH.

SOPHRONÌTIS (Greek, *modest*). *Orchidàceæ*. Dwarf epiphytic orchids, cultivated on account of their neat habit and brilliantly colored flowers.

Pseudobulbs small, with 1 or rarely 2 small flat lvs.: fls. from the top of the pseudobulbs, brightly colored; sepals and petals nearly equal, spreading; labellum with a broad middle lobe and small erect side lobes, the base leading into a cavity in the wall of the ovary; column short, the stigmatic surface covering 2 wing-like projections at its summit; pollinia 8.—About 6 species, closely related to Lælia, Cattleya, and the like; Brazil.

These plants, and also sophrocattleyas and sophrolælias, thrive in the temperature of the cattleya house. In growing season, give a moderate supply of water and plenty of fresh air. Rest them at 50° to 55°, and water sufficiently to keep them from shriveling. Grow them in shallow pots with plenty of drainage, and a thin layer of fine turfy fern-root, using no sphagnum. (Wm. Mathews.)

grandiflòra, Lindl. (*S. coccínea*, Reichb. f.). Pseudobulbs clustered: lvs. about 2 in. long, elliptic: fls. solitary, on short peduncles, 1½–4 in. across, brilliant scarlet, often with a shade of orange, with an orange labellum; sepals oblong-lanceolate; petals broadly elliptic; labellum narrow, with folded sides. Flowers during the whole winter. Organ Mts. B.M. 3709. F.S. 1:22; 17:1716. P.M. 9:193. Gn. 25:474 (var. *rosea*); 31, p. 358; 48:82. I.H. 34:32. J.H. III. 34:319; 62:13. G.C. II. 22:561; III. 9:669; 17:492; 21:266; 43: 281. G.M. 56:99. R.H. 1886:492 (var. *aurantiaca*). A.F. 6:609.

cérnua, Lindl. Very small plants with a creeping rhizome bearing 1-lvd. pseudobulbs: lvs. ovate, thick and leathery, a little over an inch long: fls. 4–8, on a st. from the axils of the lvs., bright scarlet or reddish orange, with an orange lip; sepals and petals ovate; labellum ovate-acuminate, shorter, concave. Winter. Rio Janeiro. B.M. 3677. B.R. 1129.

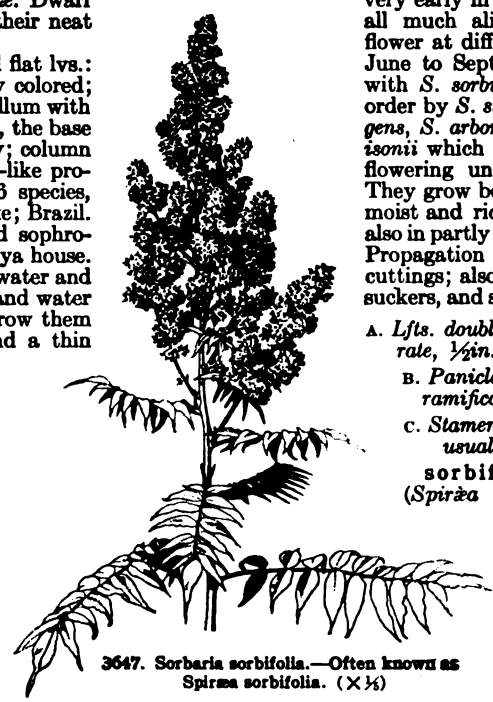
violàcea, Lindl. One of the smallest of cult. orchids: pseudobulbs ovoid, 1 in. long: lvs. linear, 2–3 in. long: fls. bright rose, about 1 in. diam.; sepals and petals oblong-lanceolate, acute; labellum rhombic-obovate, flat. Winter. Organ Mts., Brazil. B.M. 6880.

HEINRICH HASSELBRING.

SORBÀRIA (derived from Sorbus: the leaves resemble those of the mountain-ash). Syn., *Basilìma*. *Rosàceæ*. Ornamental woody plants chiefly grown for their large panicles of white flowers and the handsome pinnate foliage.

Deciduous shrubs: lvs. alternate, odd-pinnate, with serrate lfts., stipulate: fls. in terminal panicles; sepals and petals 5; stamens 20–50: carpels 5, opposite to the calyx-lobes, partly connate, dehiscent at the ventral suture, with several seeds.—Eight species in E. Asia. Formerly usually united with Spiræa but easily distinguished by the stipulate, pinnate lvs. and the 5 carpels being opposite to the sepals.

The sorbarias are very handsome upright shrubs with rather large bright green pinnate leaves and small white flowers in large and showy panicles appearing in summer and followed by small capsular fruits; the panicles, however, after the flowers have faded and dried up, become rather unsightly and should be removed. *S. sorbifolia* is hardy North and *S. stellipila*, *S. assurgens*, and *S. arborea* have proved hardy at least as far north as Massachusetts, while *S. Aitchisonii* is somewhat tenderer and *S. Lindleyana* still more so. They are well adapted for borders of shrubberies and woods or for planting on banks of brooks or rivers, but should not be brought together with slow-growing and delicate shrubs, as they spread in suitable soil rather rapidly by means of suckers and are likely to overcrowd other plants. The handsome bright green foliage appears very early in spring. They are all much alike in habit, but flower at different times from June to September, beginning with *S. sorbifolia*, followed in order by *S. stellipila*, *S. assurgens*, *S. arborea*, and *S. Aitchisonii* which usually continues flowering until September. They grow best in a somewhat moist and rich soil and thrive also in partly shaded situations. Propagation is by hardwood cuttings; also by root-cuttings, suckers, and seeds, like spirea.



3647. Sorbaria sorbifolia.—Often known as Spiræa sorbifolia. (×⅛)

A. *Lfts. doubly and sharply serrate, ½in. or more wide.*

B. *Panicles with upright ramifications, dense.*

C. *Stamens 40–50: lfts. with usually 20 pairs of veins.*

sorbifòlia, A. Braun (*Spiræa sorbifòlia*, Linn. *Basilìma sorbifòlia*, Raf.). Fig. 3647. Upright shrub, 3–5 ft. high, much spreading by suckers: lfts. 13–23, lanceolate or ovate-lanceolate, long-acuminate, doubly serrate, stellate-pubescent beneath when young or glabrous, 3–4 in. long: panicles 5–10 in. long; fls. ⅓in. across: carpels and frs. glabrous. June, July. N. Asia, from Ural to Japan. A.G. 11:125. Gn. 16, p. 217. F.E. 30:777.—Sometimes escaped from cult.

stellípila, Schneid. (*S. sorbifòlia* var. *stellípila*, Maxim.) Shrub, to 5 ft.: branchlets pubescent: lfts. 11–19, oblong-lanceolate to lanceolate, long-acuminate, stellate-pubescent beneath, 2–3½ in. long: infl. puberulous, 8–10 in. long; calyx pubescent: carpels and frs. pubescent. July. N. E. Asia, Japan. G.W. 15, p. 651.

CC. *Stamens about 20: lfts. with 25 or more pairs of veins.*

assúrgens, Rehd. Shrub, to 8 ft., with upright or ascending sts.: lfts. 13–17, oblong-lanceolate to narrow-lanceolate, long-acuminate, cuneate at the base, often falcate, pubescent on the veins beneath, 2–3½ in. long: panicle 6–12 in. long, puberulous; stamens longer than petals: carpels and frs. glabrous. July. China. V.F. 75.

BB. *Panicles with spreading ramifications, open.*

Lindleyàna, Maxim. (*Spiræa Lindleyàna*, Wall. *Basilìma Lindleyàna*, Kuntze). Four to 8 ft. high: lfts.

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15–21, lanceolate, long-acuminate, rounded or nearly so at the base, doubly serrate, with simple hairs beneath when young, 3–4 in. long: panicles 8–12 in. long and about 8 in. broad; fls. ¼in. across; stamens as long as petals or shorter. July, Aug. Himalayas, China. F.S. 2:108. B.R. 31:33. Gn. 47, p. 222; 49, p. 229; 55, p. 116; 77, p. 487; 78, p. 126. G.C. III. 43:415. G. 33:507.

arbòrea, Schneid. (*Spirǽa arbòrea*, Bean). Shrub, to 20 ft.: lfts. 13–15, ovate-oblong to lanceolate, long-acuminate, usually broadly cuneate at the base, stellate-pubescent or nearly glabrous beneath, 1½–3½ in. long: panicles 8–12 in. long, 6–8 in. wide: fls. ¼–⅓in. across; stamens much longer than petals. July, Aug. Cent. China. Gn. 77, p. 424. G.M. 61:603. G. 35:697. Var. **glabràta,** Rehd. Lfts. usually lanceolate or narrow-lanceolate, quite glabrous beneath: branchlets and petioles often purple, glabrous: stamens 2–3 times as long as petals. Cent. and W. China. This is the handsomest variety and resembles somewhat *S. Aitchisonii*. Var. **subtomentòsa,** Rehd. Lfts. usually elliptic to oblong-lanceolate, densely stellate-pubescent or tomentose beneath, with close-set veins: branchlets and petioles pubescent.

AA. *Lfts. simply or indistinctly doubly serrate, ½in. or less wide.*

Àitchisonii, Hemsl. (*Spirǽa angustifòlia*, Zabel. *S. Àitchisonii*, Hemsl. *S. sorbifòlia* var. *angustifòlia*, Wenzig). Shrub, 6–8 ft. high, with upright or ascending, little-branched, glabrous sts. usually bright red when young: lfts. 15–21, lanceolate to linear-lanceolate, acuminate, narrowed at the base, simply or obscurely doubly serrate, glabrous, 2–4 in. long: panicles to 12 in. long and to 6 in. broad, with spreading ramifications, leafy at the base; fls. ½in. or more across. July–Sept. Afghanistan, Kashmir. G.C. III. 28:255; 38:114; 43:397. G. 27:441; 31:455; 34:639. G.M. 49:42. Gn.M. 9:75. Gn. 68, p. 143; 77, p. 560. M.D.G. 1901:18.—A very desirable shrub with handsome graceful foliage.

S. grandiflòra, Maxim. (Spirǽa grandiflora, Sweet. Spirǽa sorbifolia alpina, Pallas). Allied to S. sorbifolia. One to 3 ft. high: lvs. glabrous: panicles 3–5 in. long; fls. ½in. across. S. Siberia. Gt. 9:295. —*S. Kirilòwii*, Maxim. (Spirǽa Kirilowii, Regel). Allied to S. sorbifolia. Shrub, 5–10 ft.: lfts. 12–19, glabrous: panicle broadly pyramidal; stamens as long as corolla: fr. with the style much below the apex. N. China.—*S. Millefòlium*, Focke=Chamæbatiaria Millefolium.

ALFRED REHDER.

SÓRBUS (ancient Latin name of *S. domestica*). Including *Ària, Córmus, Micromèles,* and *Torminària. Rosàceæ.* Ornamental woody plants grown for their handsome foliage, attractive white flowers and ornamental usually red fruit.

Deciduous trees or shrubs: lvs. alternate, stipulate, simple and serrate or odd-pinnate, folded or rarely convolute in the bud: fls. in compound corymbs; sepals and petals 5; stamens 15–20, with red or yellow anthers; carpels 2–5, either partly free above and half superior or wholly connate and quite inferior; styles free or connate at the base: fr. a 2–5-loculed pome, usually rather small; the cells with cartilaginous or leathery walls, each with 1 or 2 seeds. Closely allied and often referred to Pyrus, from which it is chiefly distinguished by its compound infl. and by the fls. being in most species more or less perigynous; the frs. are usually smaller and berry-like.—About 80 species distributed throughout the northern hemisphere, in N. Amer., south to N. C. and New Mex., in Asia south to the Himalayas. The frs. of some species, as *S. domestica, S. torminalis, S. Aucuparia* var. *dulcis* and var. *rossica* are edible and are made into preserves in Europe; the strong and close-grained wood of *S. torminalis* and *S. domestica* is used for handles of tools and for similar small articles.

The sorbuses are handsome trees or shrubs with graceful pinnate or with simple foliage sometimes silvery white beneath, and with showy clusters of small white rarely pinkish flowers in spring, followed by red or rarely whitish or brown fruits usually berry-like, rarely larger and apple- or pear-shaped. Most of the pinnate-leaved kinds are hardy North except some Asiatic species and *S. domestica*, which seem tender north of Massachusetts; they are chiefly inhabitants of mountainous regions, and the northern species, as *S. americana* and *S. decora*, do not thrive well in warmer and drier climates, while the simple-leaved species, as *S. alnifolia, S. intermedia, S. Aria*, and *S. torminalis*, endure drought and heat well and have proved hardy at least as far north as Massachusetts. The trees are often attacked by borers. Propagation is by seeds sown in fall or stratified, also by layers. Varieties and rarer kinds are usually budded or grafted on allied species, but most kinds will grow on *S. Aucuparia* or *S. americana* and on hawthorn. They all have handsome foliage, which usually turns orange-red in fall; their fruits are showy and often remain on the branches the whole winter if not eaten by birds. They are not particular as to the soil and are well suited for planting on rocky hillsides. Those of the Aucuparia group are more adapted for cool and moist mountain regions; those of the Aria and Torminaria group, which grow especially well on limestone soil, are suited to warmer and drier climates. *S. hybrida* is sometimes used as a small-sized avenue tree on account of its regular pyramidal habit.

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KEY TO THE SPECIES.

A. *Foliage pinnate.*
  B. *Lvs. regularly pinnate, with the lfts. of almost equal size.*
    C. *Frs. small, ¼–⅓in. across, or slightly larger, berry-like.*
      D. *Lfts. 9–17, ¾–4 in. long.*
        E. *Winter buds glutinous, glabrous or sparingly appressed, rusty-pubescent.*
          F. *Fls. ⅓–¼ in.: lfts. long-acuminate: fr. ⅓–¼ in. across* ..... **1. americana**
          FF. *Fls. ¼–⅓in. across: lfts. acute or obtusish: fr. about ⅓in. across* ..... **2. decora**
        EE. *Winter buds covered with white villous tomentum.*
          F. *Young branchlets and lvs. pubescent* ..... **3. Aucuparia**
          FF. *Young branchlets and lvs. glabrous* ..... **4. tianschanica**
      DD. *Lfts. 19–29, ½–¾in. long* ..... **5. Vilmorinii**
    CC. *Frs. ½in. or more across, apple- or pear-shaped, with grit-cells: styles 5* ..... **6. domestica**
  BB. *Lvs. only pinnate toward the base, lobed or only serrate in the upper part, varying much on the same plant and occasionally only lobed. Hybrids.*

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c. *Habit tree-like*..... 7. **hybrida**
cc. *Habit shrub-like*..... 8. **spuria**
AA. *Foliage simple.*
B. *Fr. with persistent calyx.*
C. *Under side of lvs. glabrous at length, green: lvs. lobed: ovary inferior: fr. brown, with gritcells*..... 9. **torminalis**
CC. *Under side of lvs. grayish or whitish tomentose: ovary half-superior.*
D. *Lvs. lobed or sharply serrate.*
E. *Shape of lvs. ovate to oblong, usually acute.*
F. *Margin of lvs. lobed.*
G. *Base of the usually broadly ovate lvs. mostly rounded*.....10. **latifolia**
GG. *Base of the ovate to oblong-ovate lvs. broadly cuneate*.....11. **intermedia**
FF. *Margin of lvs. sharply and doubly serrate*.....12. **Aria**
EE. *Shape of lvs. suborbicular to broadly obovate*.....13. **umbellata**
DD. *Lvs. serrulate, grayish-tomentose or sometimes glabrescent beneath*.....14. **alpina**
BB. *Fr. with deciduous calyx leaving a circular scar: ovary quite inferior.*
C. *Under side of lvs. glabrous or slightly pubescent.*
D. *Styles usually 2: lvs. ovate to elliptic-ovate*.....15. **alnifolia**
DD. *Styles usually 5: lvs. elliptic-oblong to obovate-oblong*.....16. **caloneura**
CC. *Under side of lvs. white-tomentose*. 17. **Folgneri**

Group 1. AUCUPARIA.

1. **americàna,** Marsh. (*Pỳrus americàna*, DC. *S. micrántha*, Dum.-Cours.). AMERICAN MOUNTAIN-ASH. DOGBERRY. Fig. 3648. Small tree, attaining 30 ft., with spreading branches, or sometimes shrubby: lfts. 11–17, lanceolate, long-acuminate, sharply serrate, glabrous or slightly pubescent when young, light green above, paler beneath, 1½–4 in. long: fls. ⅕–¼in. across, in dense, 3–6-in.-broad, usually glabrous corymbs: fr. globose, bright red, ⅙–¼in. across, with the calyx-lobes very small and connivent. May, June. Newfoundland to Man., south to Mich. and N. C. S.S. 4:171, 172. F.E. 23:209; 32:721. Var. **microcárpa,** Torr. & Gray (*S. microcárpa*, Pursh), has narrower foliage and very small frs. about ⅙in. across.

3648. Sorbus americana. (×⅓)

2. **decòra,** Schneid. (*S. americàna* var. *decòra*, Sarg. *Pỳrus sambucifòlia*, Gray, not Cham. & Schlecht. *Pỳrus sitchénsis*, Rob. & Fern., not Piper. *S. scopùlina*, Brit., not Greene). Small tree or shrub, closely allied to the preceding: lfts. 7–15, oval to ovate-lanceolate, or oblong, obtuse to short-acuminate, serrate, glabrous and

3649. Sorbus Aucuparia. (×⅓)

dark green above, rather pale and usually pubescent beneath when young, or glabrous, 1½–3 in. long: fls. ¼–⅓in. across, in 2–4-in.-broad and rather loose corymbs, sometimes few-fld.: fr. globose, ovoid when young, red, about ⅓in. across, with more or less upright calyx-lobes. May. Labrador to Minn., south to N. Y. and Vt. S.S. 4:173, 174.—Often confounded with the preceding species; intermediate forms are not uncommon in regions where the two meet. Both are very handsome in autumn with their large clusters of bright red fr. and particularly *S. decora* is often planted for its showy fr.

3. **Aucupària,** Linn. (*Pỳrus Aucupària*, Gaertn.). EUROPEAN MOUNTAIN-ASH. ROWAN TREE. Fig. 3649. Round-headed tree, 20–40, occasionally 60 ft. high: young branchlets pubescent, grayish brown when older: petioles more or less tomentose; lfts. 9–15, oblong to oblong-lanceolate, serrate, entire toward the base, dull green above, pubescent beneath or rarely glabrous, ¾–2 in. long: fls. white, ⅓in. across, in flat, 4–6-in.-broad, tomentose or sometimes almost glabrous corymbs; stamens about as long as petals: fr. globose, about ⅓in. across, bright red. May, June. Eu. to W. Asia and Siberia. H.W. 3:54, pp. 78, 79. Var. **dúlcis,** Kraetzl (var. *moràvica*, Zengerling). Almost glabrous: petioles purplish; lfts. oblong-lanceolate, 2–3 in. long, glaucescent beneath, usually serrate only above the middle. The frs. are of an agreeable acid flavor and recommended for preserves. The tree thrives well in cold northern climates where hardly any other fr.-tree will grow. G.M. 52:887. Var. **róssica,** Spaeth, is similar and also bears edible fr., but the lfts. are larger and broader and more serrate. Var. **Beissneri,** Rehd. (var. *dúlcis laciniàta*, Beissn., not var. *laciniàta*, Hartm.), is a handsome and graceful form of var. *dulcis* with the lfts. pinnately lobed and the lf.-stalks and young branchlets bright red. G.W. 3:267. Var. **fastigiàta,** Loud., forms a narrow pyramidal tree, with upright branches. Var. **péndula,** Hort., has long and slender pendulous branches. M.D. 1911, p. 246. Var. **integérrima,** Lange. Lfts. entire or nearly so. Var. **Fifeàna,** Dipp. (var. *frúctulùteo*, Hort.). Fr. yellow. There are also varieties with

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variegated foliage.—This species is often planted as a street tree in mountain regions of Eu.

4. **tianschánica,** Rupr. (*Pỳrus thianschánica*, Regel). Small tree or shrub, similar to the preceding: young branchlets glabrous, red-brown and glossy when older: petioles and lvs. glabrous; lfts. 11–15, lanceolate, acuminate, serrate, entire toward the base, dark green and glossy above, light green beneath, about 2 in. long: corymbs glabrous; stamens half as long as petals; styles 2–5: fr. globose, bright red. May, June. Cent. Asia. Gt. 40, p. 8. B. M. 7755.—Very handsome on account of the contrast of its dark green foliage and red-brown branches.

3650. Sorbus domestica. (×⅓)

5. **Vilmorínii,** Schneid. (*Córmus foliolòsa*, Franch.). Shrub or small tree, to 20 ft.: lvs. slender; rachis slightly winged; lfts. 19–29, opposite or nearly so, oblong-elliptic, serrate above the middle, glabrous, ½–¾in. long: infl. loose, 1–3 in. wide, rusty-pubescent; fls. ¼in. across; stamens about 20; styles 3, nearly glabrous: fr. globose, red, ⅓in. across. June; fr. in Sept. W. China. B.M. 8241.—A very graceful shrub.

Group 2. Cormus.

6. **doméstica,** Linn. (*Pỳrus Sórbus*, Gaertn. *P. doméstica*, Smith. *Córmus doméstica*, Spach). Service Tree. Fig. 3650. Round-headed tree, 30–60 ft. high: winter buds glutinous: petioles tomentose; lfts. 11–17, obovate-oblong to oblong, sharply and rather coarsely serrate, with acuminate teeth, usually entire near the base, green and glabrous above, floccose-tomentose beneath, at least when young, 1–2½ in. long: fls. white, ½in. across, in broadly pyramidal rather loose, tomentose corymbs: fr. ½–1¼ in. across, usually yellowish, with red or orange cheek, apple-shaped in var. **malifórmis,** Lodd., pear-shaped in var. **pyrifórmis,** Lodd. May. S. Eu., N. Afr., and W. Asia. G.C. II. 1:283; 6:649. M.D.G. 1897:376–8. H.W. 3, pp. 80, 81. G.W. 1, p. 158. —This species is often confounded with the European mountain-ash, from which it is almost indistinguishable without frs. or fls., except by the glutinous winter buds.

Hybrids of Group 1 with Group 4 or with Aronia.

7. **hýbrida,** Linn. (*Pỳrus pinnatífida*, Ehrh. *P. fénnica*, Babington. *S. intermèdia* × *S. Aucupària*). Tree, attaining 40 ft., of regular, pyramidal habit, with upright branches: young branchlets and petioles whitish tomentose: lvs. ovate to oblong-ovate, with 1–4 pairs of decurrent lfts. at the base, or but pinnately lobed, upper part lobed with the lobes becoming gradually shorter and more indistinct toward the apex, dark green above, whitish or grayish tomentose beneath, 2½–5 in. long; petioles about 1 in. long: fls. ⅓–½in. across, in tomentose corymbs about 3 in. broad: fr. globose-ovoid, ½in. high. May, June. H.W. 3, p. 86. S.I.F. 3:485.—A form of narrow pyramidal habit is var. **fastigiàta,** Hort. G.C. III. 42:185.—Natural hybrid, occasionally found with the parents in Eu. Two different hybrids are usually included under *S. hybrida;* the typical one is *S. Aucuparia* × *S. intermedia*, which has the lvs. oblong-ovate to oblong, 3–5 in. long, with 10–12 pairs of veins, the lfts. and lobes narrower and pointed and the veins often slightly recurved. It is mostly cult. under the name of *S. quercifòlia*, or *S. quercoìdes*, Hort. The second hybrid is var. **thuringìaca,** Rehd. (*Pỳrus thuringìaca*, Ilse. *S. thuringìaca*, Schneid.), and is a hybrid of *S. Aucuparia* × *S. Aria;* it has ovate to ovate-oblong lvs., somewhat less deeply lobed, 2½–4 in. long, with 8–10 pairs of veins, lfts. and lobes broader and obtusish, with the veins usually curving upward. This is known in gardens as *S. quercifòlia hýbrida nàna*. Var. **decúrrens,** Koehne (*S. decúrrens*, Hedl. *S. lanuginòsa*, Hort., not Kit.), is a transition to *S. Aucuparia;* only the 3 or 5 upper lfts. are connate into a terminal lft., which, like the upper separate lfts., is decurrent at the base, under side less densely tomentose. In some nurseries under the name of *S. sambucifolia.*

8. **spùria,** Pers. (*Pỳrus heterophýlla*, Dur. *S. Aucupària* × *Aròmia arbutifòlia*). Shrub or small tree, attaining 15 ft., with slender, sometimes pendulous branches: lvs. ovate to oblong-ovate, obtuse, with 2–6 lobes or lfts. near the base, simply crenate-serrate toward the apex, 1½–3½ in. long, pubescent beneath: fls. white or pinkish white, in pubescent or glabrous corymbs 1–1½ in. broad: fr. subglobose or pear-shaped, dark purple. May, June. Of garden origin. B.R. 1196. —Sometimes cult. under the name *S. quercifolia floribunda nana.* Hybrids of different origin are usually united under *S. spuria;* the more pubescent forms with dark purple fr. are probably the offspring of *S. Aucuparia* and *Aronia arbutifolia* and represent typical *S. spuria*, while the more glabrous forms with usually blackish fr. have *S. Aucuparia* and *Aronia melanocarpa* as their parents and may be called *S. fàllax*, Schneid. (*S. heterophýlla*, Dipp.). A similar form with quite glabrous and more pointed lvs., is probably a hybrid of *S. americana* and *Aronia melanocarpa*, and is named *S. sorbifòlia*, Hedl. (*S. Sárgentii*, Dipp.).

Group 3. Torminaria.

9. **torminàlis,** Crantz (*Pỳrus torminàlis*, Ehrh. *Torminària torminàlis*, Dipp. *T. Clùsii*, Roem.). Wild Service Tree. Round-headed tree, with spreading branches, 40–80 ft. high: lvs. broadly ovate, slightly cordate to broadly cuneate at the base, with several triangular-ovate, serrate lobes on each side, the lower sinuses reaching about half-way to the middle, floccose-tomentose when young, finally glabrous, rarely with persistent tomentum, 2–4 in. long; petioles 1–1¾ in. long: fls. white, ½in. across, in broad, rather loose tomentose corymbs: fr. oval, ½–¾in. high, brown, dotted. May, June. S. and Cent. Eu. H.W. 3:53, pp. 82, 83.—The foliage turns bright red in autumn.

3651. Sorbus Aria. (×¼)

Group 4. Aria.

10. **latifòlia,** Pers. (*Pỳrus rotundifòlia*, Bechst. *P. intermèdia* var. *latifòlia*, Ser. *P. Ària* var. *latifòlia*, Hort. *Torminària latifòlia*, Dipp. *S. Ària* × *S. torminàlis*). Tree, attaining 50 ft., similar to the preceding: lvs. broadly ovate to ovate, usu-

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ally rounded at the base, pinnately lobed with short, broadly triangular, sharply serrate lobes, and with 6–9 pairs of veins, grayish or whitish tomentose beneath, 2½–4 in. long; petioles ½–1 in. long: fls. about ½in. across, in broad, tomentose corymbs: fr. globose or globose-ovoid, about ½in. high, orange to brownish red. May, June. Occasionally occurring in Cent. Eu. H. W. 3, p. 85.

11. **intermèdia,** Pers. (*Pỳrus intermèdia*, Ehrh. *Sórbus scándica*, Fries. *Ària suècica*, Koehne. *Hâhnia suècica*, Dipp.). Tree, 20–40 ft. high, with oval head: lvs. ovate to oblong-ovate, broadly cuneate at the base, pinnately lobed with broad and short, irregularly serrate lobes and 5–8 pairs of veins, whitish tomentose beneath, 2½–4 in. long; petioles ½–¾in. long: fls. about ½in. across, in broad, tomentose corymbs: fr. orange-red, globose or subglobose, about ½in. high. May. N. and Cent. Eu. S.I.F. 3:485.—This is sometimes confounded with *S. hybrida* and considered to be a hybrid of similar origin, but it is certainly a good species. It never bears distinct lfts. at the base and the sinuses do not reach farther than one-third toward the middle.

12. **Ària,** Crantz (*Pỳrus Ària*, Ehrh. *Ària nívea*, Host. *Hâhnia Ària*, Medikus). WHITE BEAM-TREE. Fig. 3651. Tree, with broadly pyramidal or oval head, 25–50 ft. high: lvs. elliptic to oblong-oval, usually cuneate at the base, acute or obtuse at the apex, sharply and doubly serrate, of firm texture, bright or dark green and glabrous above, white-tomentose beneath, 2–5 in. long; petioles ½–¾in. long: fls. ½–¾in. across, in tomentose, 2–3-in.-broad corymbs: fr. subglobose, orange-red, about ½in. high. May. Cent. and S. Eu. to Himalayas and Siberia. G.M. 44:291. H.W. 3:52.—Desirable tree for dry and exposed situations, and very ornamental in foliage on account of the contrasting colors of the upper and under sides of the lvs. Var. **Decaisneàna,** Rehd. (*Ària Decaisneàna*, Lav. *Pỳrus Decaisneàna*, Nichols. *Pỳrus Ària* var. *majéstica*, Prain. *S. Ària* var. *majéstica*, Zabel). Lvs. elliptic or ovate, irregularly doubly serrate, 3–7 in. long: infl. 3–4 in. across: fls. ¾in. across; stamens longer than styles: fr. oval, ½in. across. B.M. 8184. Origin unknown, probably from the Himalayas. Var. **edùlis,** Wenzig (*Pỳrus edúlis*, Willd. *S. longifòlia*, Hedl.). Lvs. elliptic-oblong to oblong, rounded or acute at the apex, 2–5 in. long: fr. oval, ½–¾in. high. There are some garden forms, as vars. **aûrea, chrysophýlla,** and **lutéscens,** Hort., with more or less yellow foliage.

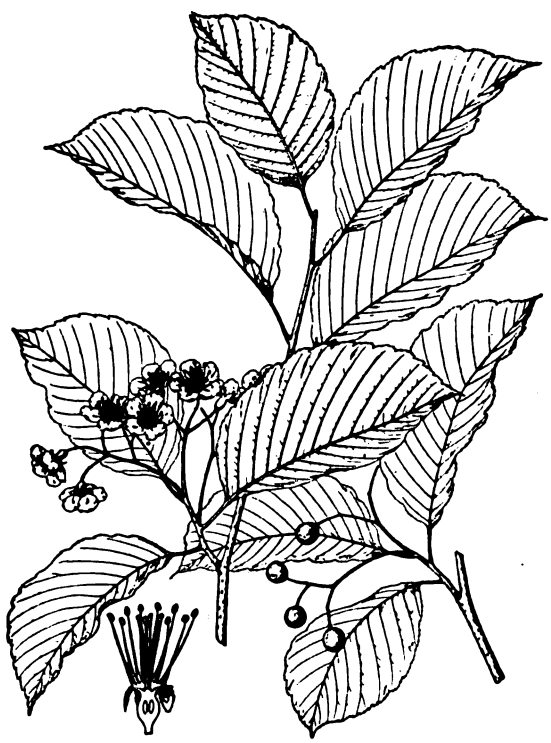
13. **umbellàta,** Fritsch (*S. meridionàlis*, Guss. *S. flabellifòlia*, S. Schau. *S. Ària* var. *flabellifòlia*, Wenzig. *S. flabellàta*, Hort.). Small tree, attaining 20 ft.: lvs. orbicular to broadly oval, obtuse, usually broadly cuneate at the base, incisely lobed above the middle, with the short lobes truncate or rounded and coarsely toothed, with 5–7 pairs of veins, snowy white beneath, 1½–2½ in. long: fls. scarcely ½in. across, in dense, white-tomentose corymbs: fr. depressed-globose, orange-red. S. E. Eu., W. Asia.—Cult. in some nurseries as *Pyrus aurea striata*. Var. **crètica,** Schneid. (*S. Ària* var. *crètica*, Rehd. *Ària græca*, Roem. *S. Ària* var. *græca*, Koch). Lvs. orbicular-obovate, doubly serrate, scarcely lobed, with 6–11 pairs of veins, 1½–3 in. long. S. E. Eu., W. Asia.

14. **alpìna,** Heynh. (*Aròmia densiflòra*, Spach. *A. Willdenòwii*, Zabel. *S. Ària* × *Aròmia arbutifòlia*). Shrub, similar to *S. Aria*, but lvs. smaller, densely serrulate, with fewer and less straight veins: infl. and fls. smaller; styles 3–4: fr. red or brownish red, ¼in. across. Of garden origin.—From *Aronia arbutifolia* it may be distinguished by usually larger lvs. with more numerous veins and with a less close and less glandular serration and by larger fls. with only 3–4 styles. A similar hybrid is *S. Dippelii*, Zabel (*S. Ària* × *Aròmia melanocárpa*) with the lvs. often finally glabrescent and black frs. over ½in. across.

Group 5. MICROMELES.

15. **alnifòlia,** Koch (*Micromèles alnifòlia*, Koehne. *Pỳrus Miyàbei*, Sarg.). Fig. 3652. Tree, to 60 ft., with upright branches: branchlets glabrous or slightly pubescent: lvs. ovate to elliptic-ovate, rounded at the base, short-acuminate, unequally serrate, glabrous above, glabrous or slightly pubescent beneath, on vigorous shoots sometimes densely pubescent, 2–4 in. long, with 6–10 pairs of veins: infl. loose, nearly glabrous, 6–12-fld.: fls. ½–½in. across; ovary usually 2-celled: fr. subglobose, ¼in. across, red with yellow. May; fr. in Sept., Oct. Cent. China, Manchuria, Korea, Japan. B.M. 7773. G.F. 7:84 (adapted in Fig. 3652). Gt. 41, pp. 283, 284; 52, p. 3. S.I.F. 1:49.

16. **caloneùra,** Rehd. (*Micromèles caloneùra*, Stapf. *Pỳrus caloneùra*, Veitch). Shrub or small tree, to 20 ft.: branchlets glabrous: lvs. elliptic-oblong to obovate-oblong, acute or sometimes short-acuminate, broadly



3652. Sorbus alnifolia. (×½)

cuneate at the base, doubly crenate-serrate, quite glabrous and dark green above, pale beneath and sparingly hairy on the veins, 2½–3½ in. long, with 10–12 pairs of veins impressed above: infl. dense, many-fld.: fls. ¼in. across, with violet-purple stamens; styles 5; ovary 5-celled: fr. pyriform, ½–½in. long, brown. May; fr. in Oct. Cent. China. B.M. 8335.

17. **Fólgneri,** Rehd. (*Micromèles Fólgneri*, Schneid. *Pỳrus Fólgneri*, Bean). Tree with spreading and arching branches: young branchlets tomentose: lvs. ovate to elliptic-ovate, acute or short-acuminate, rounded or broadly cuneate at the base, finely serrate or on shoots doubly serrate and often slightly lobed, dark green and glabrous above, white-tomentose beneath, 2–3 in. long, with 8–9 pairs of veins: infl. about 4 in. across, tomentose, many-fld.; fls. ¼–½in. across; styles 3: fr. ovoid, red, about ½in. long. May: fr. in Oct. Cent. China. M.D.G. 1912:136. Var. **péndula,** Rehd. (*Pỳrus Fólgneri* var. *péndula*, Veitch). Branches pendulous.—This is a very handsome and graceful species.

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S. apérta, Koehne. Allied to S. Aucuparia. Tree, to 40 ft.: lfts. 9–17, elliptic to elliptic-oblong, acute, serrate, glabrous, 1–2 in. long: styles 5: fr. small, whitish. W. China.—*S. arbutifólia*, Heynh.=Aronia arbutifolia.—*S. Chamæmèspilus*, Crantz (Pyrus Chamæmespilus, Poll. P. alpina, Dur. Aria Chamæmespilus, Host.). Upright shrub, 6 ft. high, allied to S. Aria. Lvs. elliptic to oblong, serrate, almost glabrous, 1½–2½ in. long: fls. pinkish, with upright petals, in dense corymbs about 1½ in. broad: fr. oval, orange to brownish red. Cent. and S. Eu. H.W. 3, p. 84. Var. *sudética*, Wenzig. Lvs. whitish or grayish tomentose beneath. Mountains of Cent. Eu.—*S. commíxta*, Hedl. (S. Aucuparia var. japonica, Maxim. S. japonica, Koehne, not Hedl.). Allied to S. americana. Small tree: lfts. 11–15, oblong-lanceolate to lanceolate, long-acuminate, glabrous, 2–3 in. long: infl. glabrous: fr. red, small. Japan. S.I.F. 2:31.—*S. Conradínæ*, Koehne. Allied to S. Aucuparia. Tree, to 25 ft.: stipules large, persistent; lfts. 11–13, oblong to oblong-lanceolate, short-acuminate, serrate, tomentose beneath, 2–3 in. long: styles usually 4: fr. globose, red, about ½in. across. W. China.—*S. cuspidàta*, Hedl. (S. vestita, Schau. Pyrus vestita, Wall. Pyrus crenata, Lindl., not Don. Cormus lanata, Koehne. S. nepalensis, Hort.). Tree, allied to S. Aria: lvs. elliptic to elliptic-oblong, acuminate, doubly serrate, densely tomentose beneath, 3–7 in. long: styles usually 5, woolly at the base: fr. about ½in. across. Himalayas. G.C. II. 1:17. B.M. 8259.—*S. Decaisneàna*, Rehd. (Micromeles Decaisneana, Schneid.). Tree, to 40 ft.: lvs. elliptic-obovate, crenate-serrulate, with 8–10 pairs of veins, nearly glabrous beneath, 2–3½ in. long: infl. tomentose, 1½ in. across; styles usually 3, connate below: fr. ovoid, red, ½in. across with deciduous calyx. Cent. and W. China.—*S. discolor*, Hedl. (Pyrus discolor, Maxim.). Doubtful species allied to S. Aucuparia; possibly the same as S. pekinensis. The plants in cult. as S. discolor probably do not belong here. —*S. Esserteauàna*, Koehne. Allied to S. Aucuparia. Tree, to 25 ft.: stipules large, persistent; lfts. 11–13, oblong-lanceolate, subacuminate, serrate, whitish tomentose beneath, 1½–3½ in. long: infl. tomentose, 4–6 in. across: fr. globose, scarlet, ½in. across. W. China.—*S. grácilis*, Koch (Pyrus gracilis, Sieb. & Zucc.). Shrub, with pinnate lvs., those at the base of the loose, few-fld. corymbs with large, incised-dentate stipules: lfts. 7–9, ovate to ovate-oblong, 1–1½ in. long: styles 2. Cent. and S. Japan.—*S. Hóstii*, Koch (Pyrus Hostii, Hemsl. Aria Hostii, Jacq. f.). Supposed to be a hybrid between S. Mougeotii and S. Chamæmespilus: shrub or small tree, 12 ft. high: lvs. oval to elliptic-obovate, sharply serrate: fls. pinkish, in dense corymbs about 2½ in. broad: fr. globose, ovoid, red. Mountains of Cent. Eu. Gn. 20:376. R.H. 1877:210.—*S. japónica*, Hedl. (Micromeles japonica, Koehne. S. Koehnei, Zabel). Allied to S. alnifolia. Lvs. pubescent above, grayish tomentose beneath: infl. denser with smaller fls.: fr. deeper scarlet, punctate. Japan. S.I.F. 1:48.—*S. japónica*, Koehne=S. commixta.—*S. japónica*, Zabel=Eriobotrya japonica.—*S. Koèhnei*, Zabel (not to be confused with S. Koehneana, Schneid., a species of the Aucuparia group, not in cult.)=S. japonica.—*S. lanàta*, Wenzig (Pyrus lanata, Don). Tree, allied to S. Aria: lvs. oval, sharply and doubly serrate and slightly lobed, 4–7 in. long: styles 2–3, connate below, woolly: fr. globose, ½–1½ in. across. Himalayas.—*S. Matsumuràna*, Koehne (Pyrus Matsumurana, Makino). Allied to S. decora. Shrub, glabrous: lfts. 9–13, oblong-ovate to oblong, acute, serrate above the middle, 1½–2½ in. long: stamens half as long as petals; styles 5: fr. red, ½in., bloomy. Japan.—*S. megalocárpa*, Rehd. Shrubby tree, to 25 ft.: lvs. elliptic-obovate to obovate-oblong, acuminate, crenate-serrate, glabrous, 5–10 in. long: infl. 4–6 in. across; styles usually 3: fr. ½–1 in. long, russet-brown. W. China.—*S. meliosmifólia*, Rehd. Allied to S. alnifolia. Tree, to 30 ft.: lvs. short-petioled, ovate to elliptic-oblong, doubly serrate, with 18–24 pairs of veins, slightly pubescent beneath, 5–8 in. long: infl. 2–4 in. across: fr. subglobose, brownish red, ½in. long. W. China.—*S. Mougeótii*, Soyer-Willemet (Pyrus Mougeotii, Aschers. & Graebn.). Allied to S. intermedia; often shrubby: lvs. ovate to ovate-oblong, lobed, short-acuminate, with 8–12 pairs of veins: fr. red, globose, ½in. across, edible. Mountains of Cent. Eu. H.W. 3, p. 83.—*S. nepalénsis*, Hort.=S. cuspidata.—S. *occidentàlis*, Greene=S. pumila.—*S. ochrocárpa*, Rehd. Allied to S. Aria. Lvs. generally elliptic, doubly denticulate-serrate, grayish tomentose beneath, 2–4 in. long: infl. small, sessile, styles 2, connate at base: fr. pale, subglobose, ½in. across. W. China.—*S. pekinénsis*, Koehne. Allied to S. americana. Tree, nearly glabrous: lfts. 13–17, oblong, acute, serrate, 1½–2½ in. long: infl. 4–8 in. across; styles 3: fr. subglobose, small, pinkish white or yellowish. N. China. Gt. 55:1551, fig. 7.—*S. pohuashanénsis*, Hedl. Allied to S. Aucuparia. Tree: stipules large, persistent; lfts. 13–15, ovate-oblong to ovate-lanceolate, whitish beneath, 1½–2 in. long: infl. 4–5 in. across, tomentose: fr. red, subglobose, ½in. across. N. China.—*S. pùmila*, Raf. (S. sitchensis, Roem. S. occidentalis, Greene. S. sambucifolia var. Grayi, Wenzig). Allied to S. decora. Shrub: lfts. 7–11, oval to oval-oblong, obtuse, serrate toward the apex, bluish green, 1–2 in. long: infl. 1–3 in. across; styles 3–5: fr. subglobose, red. Alaska to N. Calif. G.F. 10:85.—*S. sambucifólia*, Roem. Allied to S. americana. Shrub: lfts. 9–11, ovate-oblong, acuminate, serrate, glabrous, green on both sides, 2–3 in. long: infl. slightly villous: fr. subglobose, ½in. across, yellowish red. N. E. Asia. Very rare in cult., usually S. decora is cult. under this name.—*S. Sargentiàna*, Koehne. Allied to S. Aucuparia. Tree, to 30 ft.: stipules large, persistent: lfts. 9–11, oblong-lanceolate, acuminate, serrate, villous beneath while young: infl. 6 in. across; styles 3–5: fr. globose, ½in. across, scarlet. W. China. Not to be confused with S. Sargentii which see under No. 8. —*S. scalàris*, Koehne. Allied to S. Vilmorinii. Shrub, to 20 ft.: stipules large, persistent; rachis slightly winged: lfts. 25–27, linear-oblong, dentate only at the apex, villous beneath, ¾–1½ in. long: infl. tomentose; styles 3–4: fr. globose, red, ½in. across. W. China. —*S. setschwanénsis*, Koehne. Allied to S. Vilmorinii. Shrub, to 15 ft.: rachis slightly winged: lfts. 25–35, narrow-oblong, serrulate, glabrous, ½–½in. long: infl. glabrous, 1–2½ in. across; styles 2–4: fr. globose, ¼in. across, whitish or pale purple. W. China.—*S. sitchénsis*, Roem.=S. pumila.—*S. sudética*, Heynh.=S. Chamæmespilus var. sudetica.—*S. unguiculàta*, Koehne. Allied to S. Vilmorinii. Shrub, to 15 ft.: rachis narrowly winged: lfts. 23–33, oval to narrow-oblong, serrulate, villous on midrib beneath, ½–¾in. long: infl. 1–2 in. broad, slightly villous; claw or petals one-half as long as blade: fr. globose, ½in. across, whitish or pale purple. W. China.—*S. vestita*, Wall.= S. cuspidata.

ALFRED REHDER.

SORGHÁSTRUM (named for its resemblance to sorghum, a name which has been applied to Holcus). *Gramíneæ*. Grasses having the infl. as in Holcus but the pedicellate spikelet wanting, the pedicel only present.—Species about 12, mostly American.

nùtans, Nash (*Chrysopògon nùtans*, Benth. *Andropògon avenàceus*, Michx.). INDIAN GRASS. In large clumps, perennial, 3–5 ft. tall, bearing beautiful narrow panicles, 6–12 in. long, the copious golden hairs and brilliant yellow anthers producing a charming effect when in bloom, turning to a bronzy brown; culms simple, lvs. pale. A native species occurring on dry soils from the Atlantic to the Rocky Mts. Dept. Agric., Div. Agrost. 7:21. f. 15. 1897.—Useful for the wild border. One of the handsomest natives; very hardy and worthy of greater use.

A. S. HITCHCOCK.

SÓRGHUM: *Holcus*.

SORINDEÌA (said to be the native name in Madagascar). *Anacardiàceæ*. Glabrous trees or shrubs, suitable for the warmhouse and also grown outdoors in the far South.

Leaves alternate, odd-pinnate; the lfts. entire: fls. small, polygamous or dicœcious, in many-fld. panicles which are terminal, axillary, or from the old wood, often lax and divaricate; calyx 4–5 (3) -toothed, cup-shaped; petals as many as the calyx-teeth, valvate; stamens in the male fl. 10–20, occupying a central disk or as many or twice as many as the petals, inserted around the disk; ovary in the female fl. sessile: fr. drupaceous. —About 15 species, Trop. Afr. and Madagascar.

madagascariénsis, DC. GRAPE MANGO. Tree, often of large size, glabrous: lvs. odd-pinnate, more or less leathery; lfts. 7–9–11, oblong or oblong-elliptical, the terminal often obovate: panicles fascicled, lateral, or from the old wood, often 1–2 ft. long, dependent in fr., calyx broadly 5-toothed: fr. the size of a "sparrow's egg," yellow, "sweet, with the taste of turpentine." Madagascar, Trop. E. Afr., and Zanzibar.—Cult. in Trop. Asia and intro. into the southern U. S.

F. TRACY HUBBARD.

SORREL. Various species of Rumex (which see) produce large thick acid leaves which are prized for salads or for "greens." Leaves of some of the native or naturalized species are gathered as pot-herbs in many parts of the country. In the Old World, however, several species are regularly cultivated in kitchen-gardens; in this country these cultivated species are relatively little known. They are perennials of the very easiest culture. Usually they persist for a number of years after well established, giving an abundance of soft edible leaves early in the spring when herbage is scarce. They are usually grown from seeds, and plants fit for cutting may be had when the plants are one or two years old. Plants should be placed at one side of the garden where they will not interfere with the regular tillage. No special treatment is demanded. When they begin to show signs of failing, new plants should be started or the old ones may be taken up and divided. The rows should stand about 18 inches apart. Do not let the plants exhaust themselves by seed-bearing. The spinach dock (*Rumex Patientia*) is one of the best and earliest. The belleville (*Rumex Acetosa*) is also an excellent plant for the home-garden and has the advantage of following the other as a succession. Various other species may be had of European seed-dealers. See *Dock* and *Rumex*.

L. H. B.

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SORREL-TREE: *Oxydendrum.* **S., Wood:** *Oxalis Acetosella.*

SOUR GUM: *Nyssa sylvatica.* **S. Sop:** *Annona muricata.* **S. Wood:** *Oxydendrum.*

SOUTHERNWOOD (*Artemisia Abrotanum*, which see for botanical account) is a European herb, aromatic, much branched, woody-stemmed, rather tender, perennial, 3 to 5 feet tall, with pale green or grayish often variegated leaves, small yellowish flowers and minute seeds. (Fig. 3653.) It is occasionally found in family gardens, where it is grown from seed (or more often from its easily rooted cuttings, which are most readily obtained in early summer) for its pleasant taste and tonic properties, which resemble those of wormwood. It is seldom offered by seedsmen in this country because of its slight importance. M. G. KAINS.

SOWBUGS. There are two common species, *Armadillidium vulgare* and *Porcellio lævis*, known respectively as the greenhouse pillbug and the dooryard sowbug. These are small oval grayish terrestrial crustaceans (not insects) that live in damp situations. They feed, mostly at night, on decaying vegetable matter and sometimes attack germinating seeds and the roots, crown, and occasionally the leaves and blossoms of greenhouse plants, such as primulas, petunias, saxifrage, violets, geraniums, roses, and wisteria. Orchids, especially cattleyas, are liable to injury. Head lettuce is often infested, and sowbugs sometimes become a veritable pest in mushroom cellars.

Sowbugs reproduce by means of eggs which are carried by the female in a pouch on the under side of the body. The young are similar in form to the adults and are carried by the female until they attain a considerable size. There is probably but one brood annually.

Sowbugs are destroyed in greenhouses and similar situations by the use of freshly sliced potatoes or beets dusted lightly with paris green or some other arsenical. These baits should be placed on the soil near the plants to be protected in the evening, since sowbugs are nocturnal in their habits. Another excellent bait is made as follows: To a quart of corn-meal add enough brown sugar to sweeten it, then add two tablespoonfuls of paris green and stir until it is thoroughly mixed. Moisten the mixture with just enough water so that it will hold together. This bait is to be distributed around the plants as recommended above.

Water-cress sowbugs (*Mancasellus brachyurus*).—In the eastern United States water-cress is often seriously injured by an aquatic species of sowbug that attacks the submerged portions of the plant, cuts off the roots and stems, and causes large masses of the cress to float on top of the water. This form differs from the species found in greenhouses by having longer legs and antennæ and being shrimp-like in form when viewed from the side. It is about ½ inch in length and gray in color. It often occurs in immense numbers so as practically to destroy the whole crop. Where cress is grown in natural streams or ponds no practical method of controlling the sowbugs has been devised. Some growers, however, have been able to overcome the difficulty by growing the plants in broad shallow beds sloping toward the center, where a trough 10 inches square, lined with boards, extends the whole length of the bed. When the sowbugs become abundant, the water is shut off for twelve to twenty-four hours, allowing the beds to drain. Water is retained in the trough in which the sowbugs soon accumulate in great numbers. They may be destroyed by the addition of a liberal quantity of copper sulfate solution. Less injury will result to the plants if the water is drained off soon after the cress has been gathered. C. R. CROSBY.
M. D. LEONARD.

SOW THISTLE: A name for the prickly weedy species of Sonchus.

SOYBEAN (*Glycine Soja*, formerly called *G. hispida*) is a legume, long a staple crop in Japan, but somewhat recently cultivated more or less extensively in the United States. (Figs. 479, 483.) In its native country, Japan, the seed is an important human food product, but in the United States its principal use at present is as a forage plant for farm live-stock and as a soil-renovator. It is an upright leafy branching plant, growing 3 to 4 feet high. Two distinct plants have been called soybean: the smaller one (*Phaseolus aureus*) is grown principally in southern Asia; the larger species, the true soybean, is *Glycine Soja*. This latter species has become popular in some sections of the United States because of its power of resisting drought and for the further reason that is may supply a large amount of forage rich in protein. In the northern states it is probable that the soybean will be acclimated and that it will serve as an adjunct to the maize crop as a food for stock, although it is coarse in leaf and stalk.

3653. Southernwood. (×½)

It thrives best upon a warm well-drained loamy soil, and seed should not be planted until all danger from frost is over. The land should be prepared by plowing and harrowing in the early spring, and the harrow should be used two or three times before the seeds are planted. Best success is attained by planting in drills, rows to be from 2½ to 3 feet apart and the hills in the row 18 to 20 inches apart. During the early periods of growth, cultivation should be frequent, preferably with a fine-toothed implement. After the plants have grown so that the ground is well shaded, the tillage may be discontinued. It is doubtful whether the curing of the plants for hay will ever come into general practice, but the crop may be largely grown for green soiling and for ensilage purposes. It may be cut into the silo with corn and serves to improve the quality of the food.

To the horticulturist the soybean is valuable chiefly as a soil-renovator. The soil of the orchard can be given clean culture during the early summer and the soybeans may be sown broadcast about July 1 and harrowed in. One bushel of seed to the acre will be required. One bushel of rye to the acre should be sown at the same time, for when the beans are killed down by the frost in the fall the rye will then serve as a cover-crop for the winter. When the soil is so hard and forbidding that clover will not thrive, the soybean may be made to serve as a nitrogen-gatherer. See *Glycine*.
L. A. CLINTON.

SPÆNDÓNCEA: *Cadia.* **S.** *tamarindifólia*, Desf.=*Cadia purpurea.* H.F. II. 4:114.

SPANISH BAYONET: *Yucca.* **S. Broom:** *Spartium junceum.* **S. Lime:** *Melicocca bijuga.* **S. Oyster Plant:** *Scolymus.*

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SPARÁXIS (Greek word referring to the torn or lacerated spathes, a character which distinguishes this genus from Tritonia). *Iridàceæ.* WAND-FLOWER. Bulbs or corms with fibrous coating, the plants suitable for outdoor planting but grown mostly under glass.

Stems simple or slightly branched: lvs. few, flat, sword-like or broadly linear, erect or falcate: spathes few, remote or sometimes solitary, broad-striate or frequently marked with short brown lines: fls. 1 to a spathe, sessile, rather large, yellow; perianth-tube short and slender, 6-lobed; ovary 3-celled: caps. membranaceous, ovoid or oblong, included in the spathe.—About 3 species, Cape Colony, S. Afr. Sparaxis is a group of spring-blooming Cape bulbs of the Ixia tribe, with spikes of 6-petaled, more or less funnel-shaped fls. 1–2 in. across and exhibiting an extraordinary range of color and throat-markings. These plants are less popular than ixias, which they much resemble. The plants are dwarfer and more compact than ixias, usually 6–12 in. high, the spikes are shorter and fewer-fld., and the blossoms are sometimes larger. Sparaxis is essentially distinguished from Ixia and other allied genera by the subregular perianth, unilateral and arcuate stamens, and scarious lacerated spathe-valves.

3654. Sparaxis tricolor. (×⅓)

Although a few plants of sparaxis are occasionally cultivated in America by bulb-fanciers, one may search through many American catalogues without finding them listed. The Dutch bulb-growers offer twenty-five distinct kinds, which is perhaps a quarter of the number of varieties of ixias in cultivation. According to J. G. Baker, there is "only one species in a broad sense, varying indefinitely in the size and coloring of the flowers." For practical purposes Baker recognizes the three species given below; of these the most important and variable is *S. tricolor.*

Sparaxis pulcherrima of the Dutch trade is properly *Dierama pulcherrima,* Baker. This grows as much as 6 feet high and has pendulous bright blood-purple flowers but apparently with pale rose and perhaps other varieties (also a white variety). It is distinguished by its pendulous flowers with regular perianth, simple style-branches, equilateral stamens, and large bracts which are not laciniate. B.M. 5555. F.S. 17:1810. Gn. 20:588; 44, p. 281. G. 16:386; 29:197. G.L. 27:152. This plant is said by F. W. Burbidge to be "perhaps the most graceful of all the Cape irids." (See Vol. II, page 1007.)

A. *Throat of fl. same color as segms.*

B. *Fls. small; segms. ½–¾in. long.*

bulbífera, Ker. Corm globose, ½–¾in. thick: basal lvs. about 4, linear or lanceolate, ½–1 ft. long: sts. ½–1 ft. long, simple or branched, bearing low down 2–3 small lvs., often with bulbils in the axils: fls. solitary or few in a spike, yellow; perianth-tube ½in. long. B.M. 545 (as *Ixia bulbifera*).—To this species Baker refers *S. albiflòra,* Eckl., with fls. whitish inside, and *S. violàcea,* Eckl., with dark purple fls.

BB. *Fls. larger; segms. 1 in. or more long.*

grandiflòra, Ker. Habit, corm, lvs., and spathe just as in *S. bulbifera* but the fls. larger, the limb 1 in. or more long, usually yellow or purple, and larger anthers. B.R. 258 (fls. white inside, midvein on the back purple). B.M. 541 (as *Ixia grandiflora;* fls. rich purple, margined lighter); 779 (fls. primrose inside, flamed purple outside).—The principal named forms are: Var. **atropurpùrea,** Hort., dark purple; var. **anemonæflòra,** Hort., pale yellow; var. **Liliàgo,** Baker, white, flushed with claret-purple outside; and var. **stellàris,** Baker, dark purple, the segms. narrower than the type, oblanceolate and acute rather than oblong.

AA. *Throat of fl. bright yellow, often with a dark blotch on the lower part of each segm.*

tricolor, Ker. Fig. 3654. Differs from *S. grandiflora* only in the color of the fls., which are very variable but always have a bright yellow throat and often a dark blotch at the base of each segm. B.M. 381 (as *Ixia tricolor*); 1482. F.S. 2:124. F. 1843:213 (as *S. picta, S. purpurea, S. pulchella*).—According to Baker, this is the favorite species among cultivators. It certainly has the greatest variety of colors and markings. In the works cited the floral segms. range from nearly white through rose, brick-red, carmine, crimson, and light purple to dark purple, excluding blue and yellow, which latter color usually appears in the throat.

WILHELM MILLER.

SPARGÀNIUM (Greek, *fillet,* referring to the ribbon-like leaves). *Sparganiàceæ.* BUR-REED. Marsh or aquatic herbs which may be used in the bog-garden or along the pond-edge. Pflanzenreich, IV, 8. 1900.

Leaves alternate, sessile, linear-elongate, erect or floating, entire: fls. monœcious, in globular, sessile, or pedunculate heads, the upper bearing 3-androus, naked fls. and minute scales, the lower consisting of numerous sessile or shortly pedicelled pistillate fls.; ovary 1–2-celled: fr. obovoid or spindle-shaped, 1–2-seeded.—About 15 species, temperate and subfrigid regions of the northern hemisphere and in Austral. Bur-reeds are marsh herbs closely allied to cat-tails but with fls. in globular heads instead of oblong spikes. A few hardy perennial kinds are advertised by collectors of native plants and one or two are procurable from specialists in aquatics. Bur-reeds are desirable only in bog-gardens or in wild-gardening operations. The beauty of these plants often lies in each species being massed alone, as well as in the mixing with other plants.

A. *Infl. unbranched.*

símplex, Huds. Sts. weak and slender, 1½–2 ft. high, unbranched: lvs. more or less triquetrous: staminate heads 4–6; pistillate 2–6, 5–8 lines in diam.: fr. stalked. June–Aug. N. Amer.

AA. *Infl. branched.*

B. *Height 3–8 ft.*

eurycárpum, Engelm. Sts. stout, 3–8 ft. high, branching: lvs. linear, flat, slightly keeled beneath: staminate heads numerous, pistillate 2–4 on a st. or branch, 10–16 lines in diam.: fr. sessile, angled, depressed at the summit. May–Aug. N. Amer.

BB. *Height 2–4 ft.*

ramòsum, Huds. Lvs. 3-angled at the base, long and linear: heads 5–9, disposed in axillary and terminal, interrupted spikes, the lowest one larger and pistillate, the others wholly staminate; pistillate heads 8–10 lines in diam. July. Old World. WILHELM MILLER.

SPARMÁNNIA (named for Andreas Sparmann, 1747–1787). *Tiliàceæ.* Shrubs or trees, with soft stellate pubescence, grown in the greenhouse and also out-of-doors in the southern United States.

Leaves cordate, dentate, or lobed: fls. white, in terminal, umbelliform little cymes; sepals 4, petals 4, naked at the base; stamens numerous, free; ovary nearly 4-celled: caps. globose, spiny.—About 5 species, Afr.

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Sparmannia africana is of easy treatment under glass in a moderate temperature with plenty of air and light. The plants are benefited by being plunged in the garden in the summer and syringed during dry weather. Plants should be potted early in spring. The tips of young shoots root readily with 60° of heat.

A. *Lvs. deeply 5–7-lobed.*

palmàta, E. Mey. A slender shrub much smaller in all its parts than *S. africana:* branches half-herbaceous: lvs. on long petioles, the lobes long-acuminate, incisely sinuate and unequally toothed, prominently 5–7-nerved below: fls. white or purplish, densely arranged on the subterminal peduncles: caps. 4-celled. S. Afr.—Sparingly cult. in S. Calif.

AA. *Lvs. not lobed.*

africàna, Linn. A large shrub or tree, 10–20 ft. high: lvs. cordate-acuminate, 5–7-angled, unequally toothed, 5–6 in. long, 7–9-ribbed below: fls. white, on many-fld. peduncles: caps. 5-celled. S. Afr. B.M. 516. G.M. 37: 233. R.H. 1858, p. 105. Gn. 45:528; 76, p. 192. G. 22: 689; 27:195. Gn.W. 22: suppl. March 25. G.W. 5, p. 566.—A useful greenhouse plant. Var. **flòre-plèno,** Hort., is also grown. G.C. II. 19:477.—*S. africana* is not common in S. Calif., but is highly esteemed. One specimen, 40 years old, is 12 ft. high and 16 ft. through, and consists of about 50 trunks ½–4 in. diam. It is literally covered with snowballs of 4 in. diam., the blooms being so heavy that the ends of the branches touch the ground, necessitating severe pruning as soon as blooms were past beauty. No viburnum, hydrangea, or other shrub can compare with it at its blooming season. During the remainder of the year it has the appearance of a clump of basswood suckers, the lvs. being nearly identical in appearance with those of the basswood. It is therefore a dense mass of broad lvs. and looks well anywhere and at any time. This is one of the finest white-fld. shrubs or trees in cult. The double variety is not so desirable as the single. (Ernest Braunton.)

F. W. Barclay.

SPARTÌNA (Greek, *spartine,* a cord, referring to the tough leaves). *Gramineæ.* Perennial marsh-plants of various parts of the world, most or all of which are found in the U. S.: culms rigid and reed-like: lvs. coarse and rough, usually becoming rolled inward: spikelets 1-fld., strongly flattened, sessile, closely imbricated in 2 rows on one side of a narrow rachis; spikes 2 to several in a raceme.—Species about 10, most of them found in saline marshes of the seacoast.

Michauxiàna, Hitchc. (*S. cynosuroìdes,* Amer. Auth., not Roth). Fresh-water Cord-Grass. Fig. 3655. Culms 3–6 ft.: blades narrow, 2–4 ft., tapering to a long slender point, flat but soon involute in drying, the margins very scabrous: spikes 5–20, scattered, spreading, 2–4 in. long.—In the West known as "slough-grass." A common coarse fresh-water marsh grass, occurring across the continent in the northern states. Recommended for cult. along the margins of ponds and artificial lakes. Procurable from collectors.

S. cynosuroìdes, Roth (S. polystachya, Willd.), on the Atlantic and *S. foliòsa,* Trin., on the Pacific coast act as mud-binders and are important factors in the natural reclamation of salt-marshes. In England, *S. stricta,* Roth, and *S. Tòwnsendii,* Groves, perform the same service. G.C. III. 43:33. *S. alterniflòra,* Loisel., is common to the British Isles and the St. Lawrence and New England coasts.—A yellow-margined form (S. cynosuroides var. aureo-marginata) is shown in G. 31:171.

A. S. Hitchcock.

SPÁRTIUM (Greek, *spartos,* the ancient name of the plant). Syn., *Spartiánthus. Leguminòsæ.* Ornamental hardy shrub grown chiefly for its bright yellow flowers.

Leaves alternate, simple, small: fls. in terminal, loose racemes; calyx split above, hence 1-lipped, with 5 minute teeth; keel incurved, acuminate: pod linear, compressed, many-seeded; seeds with callose appendage at the base, like in Genista.—One species in the Medit. region and the Canary Isls. Allied to Genista and Cytisus, but chiefly distinguished by the 1-lipped calyx. The slender branches yield fiber, which is used in S. France and Spain for making ropes, cords, and cloths.

This is a handsome shrub with long and slender rush-like green branches, small and sparse foliage and showy papilionaceous flowers in terminal racemes. It is especially adapted for warmer and drier regions; in the East it is probably hardy as far north as Philadelphia. It becomes naturalized easily, as happened in several localities in South America, whence it was afterward described as *S. americanum,* Meyen. It grows in almost any kind of well-drained soil and is well suited for planting on exposed sandy and rocky situations. Propagation is by seeds and by greenwood cuttings under glass.

3655. Spartina Michauxiana.

júnceum, Linn. (*Genìsta júncea,* Lam. *Spartiánthus júnceus,* Link). Spanish Broom. Upright shrub, 10 ft. high, with slender, terete, green, rush-like branches sparingly leafy or almost leafless: lvs. oblanceolate to linear, entire, bluish green and sparingly appressed pubescent, ½–1½ in. long: fls. fragrant, yellow, about 1 in. long, with ample standard: pod linear, pubescent, 2–3 in. long. June–Sept., in Calif. blooming almost the whole year. B.M. 85. B.R. 1974 (as *S. acutifolius*). Gn. 22, p. 404; 34, p. 284; 44, p. 57.—There is a double-fld. form. Var. **ochroleùcum,** Sprenger, has whitish fls.

For other species sometimes referred to Spartium see Genista and Cytisus. For *S. ætnense,* Biv., *S. feroz,* Poir., *S. monospermum,* Linn., *S. radiatum,* Linn., and *S. virgatum,* Ait., see Genista; for *S. purgans,* Linn., *S. scoparium,* Linn., and *S. multiflorum,* Ait., see Cytisus.

Alfred Rehder.

SPARTOCÝTISUS FÍLIPES, Webb.: *Cytisus filipes.*

SPATHÈLIA (from the Greek for a *staff*). *Rutàceæ.* Odd evergreen trees without branches, grown in the warmhouse and the American tropics.

Trunk simple, the lvs. aggregated at its extremity, so that the plant has the look of a tree-fern or palm: lvs. alternate, odd-pinnate; lfts. many-paired, alternate, linear-oblong or sickle-shaped, subentire or serrate, the margin glandular: fls. polygamous, rather large, short-pedicelled, in large panicles, which are terminal, elongated and branched, the ultimate branches somewhat cymose; calyx 5-parted, the segms. spreading, valvate or subvalvate; petals 5, imbricate; disk none; stamens 5; ovary 3-angled, 3-celled: drupe without juice, elliptic-oblong, 3-edged, 3-winged, the shell stony.—About 5 species, W. Indies.

símplex, Linn. St. slender, usually leaning, resembling a palm, 20–50 ft. high: the lvs. and panicles are frequently several feet long; lfts. 20–40 pairs, very variable, opposite or alternate, sessile or petiolulate, cordate or obliquely rounded at base, oblong- or linear-lanceolate, crenate or entire: panicle powdery. Sometimes planted in the W. Indies. B.R. 670.

F. Tracy Hubbard.

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SPATHIPHÝLLUM (Greek word, referring to the leaf-like spathes). *Aràceæ*. Stemless or short-stemmed herbs, used as warmhouse foliage plants.

Leaves large, oblong or lanceolate, acuminate or cuspidate, midrib strong: spathe lf.-like, membranaceous, oblong or lanceolate; spadix shorter than the spathe, sessile or stipitate, cylindrical, densely fld.: fls. hermaphrodite, all fertile; perianth-segms. 4, 6, or 8, connate or coherent in a truncate or lobed cup; stamens 4, 6, or 8; ovary oblong, 3–4-celled: berry globose or oblong-conical, 3-celled, cells 1–2-seeded.—About 27 species, mostly from Trop. Amer., one or two Malayan. Monographed by Engler and Krause in Engler's Pflanzenreich, hft. 37 (IV. 23B), 1908. Gardeners recommend as soil for their cult. a mixture of leaf-mold, peat, and fibrous loam, together with some sand and charcoal.

A. *Petals free, 6–8, in 2 rows, sometimes stuck together, never connate; stamens 6–8, rarely 4 or 5; ovary 3–4-celled, oblong, style pyramidal, more or less exserted, coronate.*

Section EUSPATHIPHYLLUM.

B. *Ovary-cells 8-, 6-, or 4-ovuled.*

cochlearispàthum, Engler (*S. heliconiifòlium*, Schott). Caudex short: lvs. thin, membranaceous, broadly oblong, margin usually slightly undulate, base rotundate or subcordate, 20–30 x 8–10 in.: spathe oblong, 6–12 in. long, base more or less acute, apex gradually narrowed to a cusp, somewhat decurrent on the peduncle. Mex. I.H. 21:189.

BB. *Ovary-cells 2-ovuled.*

blándum, Schott. Lvs. elliptic-oblong or oblong, acute, base rather suddenly narrowed and concaved, 10 x 4 or more in.: spathe pale on both surfaces, elliptic-oblong, about 3 in. long, base suddenly narrowed, apex cuspidate-acuminate, narrowly decurrent on the peduncle. Dutch Guiana.

AA. *Petals free; ovary shortly obpyramidal, hexagonal, top truncate, style not at all distinct.*

Section AMOMOPHYLLUM.

B. *Petiole about equaling or slightly shorter than blade.*

floribúndum, N. E. Br. Lvs. oblong-elliptic or oblong-lanceolate, base obtuse finally abruptly contracted to a knee or acute, apex acute, about 6 x 3 in., upper surface rich green, lower paler: spathe white, oblong-lanceolate, about 3 in. long, long-cuspidate; spadix yellow-green or whitish. Colombia. I.H. 21:159 (as *Anthurium floribundum*). F. 1880, p. 76.

BB. *Petiole almost twice as long as blade.*

Patínii, N. E. Br. (*S. cándidum*, N. E. Br.). Lvs. elongate-lanceolate, both ends long-narrowed, apex very acute, 8–9 x 1½–2½ in.: spathe whitish, oblong-lanceolate, about 2¾ x ¾in. Colombia. I.H. 27:397. F.M. 1875:160. F. 1879, p. 19.

AAA. *Petals connate in a 6-angled cup which is truncate or 6-lobed; stamens 6; ovary obovoid or ovoid and 3-celled, top rather flat; cells 2-, 4-, 6-, or 8-ovuled.*

Section MASSOWIA.

cannæfòlium, Schott; also spelled *cannifolium* (*Pòthos cannæfòlia*, Dry. *S. cándicans*, Poepp.). Lvs. membranaceous, ovate-oblong or elliptic-oblong, base rather gradually running down to a knee, apex short-acuminate, slightly unequally so, 12–32 x 4–6 in., upper surface dark green, shining, lower paler and dull: spathe stiffly membranaceous, outside green, inside white, lanceolate, or elliptic-oblong, 4½–8 in. long, base suddenly narrowed, scarcely decurrent, apex short-cuspidate; spadix greenish or yellowish. W. Indies. Colombia. B.M. 603.

Hybrid, unclassed.

hýbridum, N. E. Br. A hybrid between *S. cannæfolium* and *S. Patínii*. Petioles 6–8 in. long; lf.-blades broadly lanceolate to oblong-lanceolate, acuminate, 8–9 in. long: spathe white on both sides, lanceolate, acuminate, 4–5 in. long; spadix 2 in. long. I.H. 29:450. G.C. II. 19:500.

S. Ghiesbrèghtii, Hort., is offered in the trade, but is unknown botanically.—*S. pictum*, Hort. Lind.=Rhodospatha picta.

F. TRACY HUBBARD.†

SPATHÒDEA (Greek, *spathe-like*, referring to the shape of the calyx). *Bignoniàceæ*. Two or 3 evergreen trees native of Trop. Afr. with large odd-pinnate opposite or sometimes ternate lvs., the lfts. entire, and with large fls. in terminal panicles or racemes: calyx large, split on one side and recurved, exposing the corolla to the base; corolla large, broadly campanulate and ventricose; stamens 4, exserted but shorter than the corolla, with spreading and pendulous anther-cells; disk large, cup-shaped; ovary oblong, with the ovules in several rows: caps. oblong-lanceolate, acuminate at the ends, loculicidal with woody valves; seeds elliptic, broadly winged.—The spathodeas are handsome evergreen trees with large pinnate foliage and large and very showy orange-red or scarlet fls. They can be grown only in subtropical or tropical countries and demand rich and well-drained soil with sufficient moisture during the growing period; they are rarely grown in greenhouses, as they need much space and do not bloom until they have attained a large size. Prop. is by seeds or by cuttings. See also *Radermachia* for cult.

campanulàta, Beauv. Tree, to 70 ft., glabrescent: lvs. 1–1½ ft. long; lfts. 9–19, short-stalked, ovate-lanceolate, abruptly short-acuminate, entire at the base with 2 or 3 fleshy glands, glabrous or somewhat pubescent beneath while young, 2–4 in. long: fls. scarlet, in many-fld. racemes or panicles; calyx coriaceous, boat-shaped, recurved, 2½ in. long; corolla about 4 in. long, with ovate, plicate, and somewhat undulate lobes; ovary papillose: caps. 8 in. long, glabrous. Trop. Afr. B.M. 5091. F.S. 8:830. J.F. 4:388. G.C. III. 50:458.

nilótica, Seem. Shrubby tree, to 20 ft.: branchlets pubescent: lvs. ½–1⅓ ft. long; rachis pubescent; lfts. 9–15, ovate-oblong, short-acuminate, entire, glabrous above, densely pubescent or tomentose beneath, 1½–4 in. long: fls. almost like those of the preceding species, in short dense racemes; calyx densely tomentose, 1½–2 in. long. Cent. Trop. Afr. H. Johnston, Uganda protectorate, 1:68.—In its smaller size this tree has an advantage over the preceding species the fls. of which are usually borne so high on the tree as to be almost out of sight.

S. lævis, Beauv., is now referred to Newbouldia which differs from Spathodea chiefly in the shape of the calyx which incloses the base of the corolla and is split on one side and 2-lobed at the apex, and in its funnelform-campanulate corolla, the inclosed stamens with parallel anther-cells: caps. elongated-linear with leathery valves; seeds with the wing emarginate on one side. *N. lævis*, Seem. (Spathodea speciosa, Brongn.). Shrub or tree, to 40 ft., nearly glabrous: lvs. opposite or ternate, 1–2 ft. long; lfts. 7–13, ovate-oblong, obtusely acuminate, serrate, glabrous or nearly so, 3–8 in. long: fls. white with purple spots or pink or purple, in dense terminal panicles; calyx oblong, 2-lobed at the apex, ¾–1 in. long; corolla 2–2¼ in. long, limb slightly 2-lipped with spatulate-obovate lobes. Trop. W. Afr. B.M. 4537. J.F. 1:51. F.S. 6:634, H.U. 5:357. The bark has medicinal properties.—*S. pentándra*. Hook. (B.M. 3681), is apparently a form of N. lævis with 6-lobed pale purple corolla and 5 stamens.—*S. speciòsa*, Brongn.=Newbouldia lævis.

ALFRED REHDER.

SPATHOGLÓTTIS (Greek, *spathe* and *tongue;* said to refer to the shape of the lip). *Orchidàceæ*. Plants agreeing with Bletia in habit and form of inflorescence; terrestrial orchids of the Old-World tropics, mostly with numerous flowers.

Pseudobulbs broadly conic, 1–3-lvd.: lvs. elongate, long-petioled, narrow, plicate, articulated: scape lateral, bearing large fls. in a terminal raceme: sepals free, subequal; petals similar or broader and longer;

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labellum not spurred, lateral lobes somewhat convolute, middle lobe clawed; column slender; pollinia 8.—About 40 species in Asia, Austral., and the Malay Isls.

Spathoglottises grow best at the warm end of the cattleya or Brazilian house in a moist shady location. Pot culture suits them best, and the compost should consist principally of equal parts peat fiber and sphagnum moss with a little chopped sod added; about half of the pot should be devoted to drainage. They all require a liberal amount of water when growing, but only enough to keep them in sound condition when at rest. They are rather hard to increase by division and the supply depends upon new importations. (Robt. M. Grey.)

3656. Spathoglottis Vieillardii. (×½)

plicàta, Blume. Lvs. 2–4 ft. long, finely acuminate: scape 2–3 ft. high, with a raceme 6–12 in. long: fls. 1 in. across, lilac; sepals and petals broad, acute; middle lobe of the labellum long and narrow, cuneately dilated at the tip; calli yellow, villous. Malay Penins. O. 1911:48.

aùrea, Lindl. (*S. plicàta*, Griff.). Lvs. 12–18 in. high, narrowly lanceolate: scape tall and stout, 2 ft. high: raceme 6–8 in. long; fls. 1½ in. across, golden yellow; sepals broad, obtuse; middle lobe of the labellum equaling the falcate lateral lobes, narrowly lanceolate. Malay Penins. G.C. III. 4:93.—The lip varies, being sometimes broad and retuse at the apex.

Vieillàrdii, Reichb. f. (*S. Augustòrum*, Reichb. f.). Fig. 3656. Lvs. long-lanceolate, acuminate, 1–2 ft. long: scape 12–18 in. high, robust: raceme 6 in. long, broad, corymb-like at first; fls. 2 in. across, very pale lilac, nearly white; sepals and petals ovate-oblong, subacute; labellum as long as the sepals, lateral lobes orange-brown, with orange calli speckled with red, middle lobe narrow, with a broadened tip variable in form. New Caledonia. B.M. 7013. A.G. 12:93. A.F. 6:631. J.H. III. 51:425.

S. aùreo-Vieillàrdii, Hort., is a hybrid between this and S. aurea. Fls. pale chrome-yellow, with the sepals slightly and the petals profusely dotted with crimson, the tips of the lobes of the lip rich crimson. G.C. III. 23:309. G.M. 41:308.—*S. Còlmanii*=S. aurea var. ×S. aureo-Vieillardii.—*S. edinénsis*=S. Fortunei×S. pulchra.—*S. Hardingiàna*, Par. & Reichb. f. Scapes basal, up to 15 in. tall: fls. numerous, rose-purple or pale lilac, about 1 in. diam.; sepals lanceolate; petals linear-lanceolate; lip linear, auricled at base, with 2 yellow brown-spotted tubercles. N. Burma. B.M. 7964.—*S. kewénsis*=S. plicata var. Micholitzii×S. Vieillardii.—*S. Kimballiàna*, Hook., is often regarded as a variety of S. aurea, from which it differs in having the backs of the sepals mottled with red-brown, the crest glabrous, and narrower lvs. B.M. 7443.—*S. plicàta* var. *Micholitzii* is advertised by Sander. Fls. amethyst-color, with the segms. broader than in the type. Habit more dwarf.—*S. Southeriàna*, F. M. Bailey. Fls. in upright spikes, more than 1 in. across; sepals and petals light rose-color. Queensland.—*S. zebrina*=S. Fortunei×S. plicata.

HEINRICH HASSELBRING.

SPATHYÈMA: *Symplocarpus.*

SPATTER-DOCK: *Nuphar advena.*

SPEARMINT: *Mentha.* **Spear-wood:** *Eucalyptus doratoxylon.* **Spearwort:** Species of *Ranunculus.*

SPECULÀRIA (from *Speculum Veneris*, meaning Venus' looking-glass). *Campanulàceæ.* VENUS' LOOKING-GLASS. Erect or decumbent, hispid or glabrous annual herbs, suitable for outdoor garden planting.

Leaves alternate, entire or dentate: fls. blue, violet, or white, sessile or short-pedicelled, axillary; calyx-tube adnate, oblong or linear, limb 5-parted; corolla subrotate, or broad-campanulate, 5-lobed; stamens free; ovary inferior, 3-celled: caps. oblong or linear.—About 10 species, northern hemisphere, 1 also occurs in S. Austral. Closely allied to Campanula but differing by the very long calyx-tube, ovary, and caps. The long calyx-tube is one of the most conspicuous features of the plant and has perhaps served to suggest the handle of the mirror. There is one North American species, *S. perfoliata*, which differs from all the rest in having perfoliate lvs. and the caps. dehiscing laterally near the middle instead of near the calyx-lobes. It is a weed.

S. Speculum is a pretty little hardy annual herb with five-lobed blue flowers not quite an inch across. The plants grow about 9 inches high, bloom in spring and summer and are desirable for edging flower-beds. They are of easy culture. See *Annuals.*

A. *Peduncles about 3-fld.*

Spéculum, DC. (*Campánula Spéculum*, Linn.). VENUS' LOOKING-GLASS. Fig. 3657. Erect, 9 in. high: calyx glabrous or pubescent, the tube constricted at the apex; lobes finally reflexed, according to DeCandolle. Eu. B.M. 102. Var. **álba,** Hort., is a white-fld. form. Gn. 72, p. 253. Var. **procúmbens,** Hort., is offered abroad in addition to lilac and double forms. R.H. 1897, p. 254.

AA. *Peduncles 1-fld.*

pentagònia, DC. Calyx pilose, lobes spreading. Asia Minor. B.R. 56.—This species is not now advertised in Amer. Some specimens have narrow lvs. and longer calyx-tube than *S. Speculum.* An interesting feature of this species (and perhaps others) is the 5-angled fl.-buds.

F. TRACY HUBBARD.†

SPEEDWELL: *Veronica.*

SPELT: *Triticum.*

SPÉRGULA (Latin, *spargere*, to scatter; the seeds are said to be expelled). *Caryophyllàceæ.* Annual herbs including SPURRY (which see), a forage plant adapted to poor dry sandy soils: lvs. subulate, appearing whorled from the cluster of secondary lvs. at the axil; stipules small and scarious: fls. pedicelled, in cymose racemes; sepals 5; petals 5, entire; stamens 10, rarely 5; styles 5, alternate with the sepals; ovary 1-celled, many-seeded: caps. 5-valved, the valves opposite the sepals.—About 5, possibly more species, temperate regions of the world. Some of the species are dichotomously branched, but the following has clusters of branches originating at or near the base.

3657. Venus' looking-glass.—Specularia Speculum. (×½)

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arvénsis, Linn. Annual, 6–18 in. high, branched at or near the base, bright green, little if at all viscid: lvs. linear, clustered at the nodes in 2 opposite sets of 6–8 together, appearing as if verticillate: fls. numerous, small, white, about ¼in. across and borne in terminal panicles: seeds papillate. Eu. **S. satîva,** Boern., the cult. SPURRY is a dull green viscid plant, with margined not papillate seeds. Eu. F. TRACY HUBBARD.†

SPHÁCELE (old Greek name). *Labiàtæ.* A score or more of shrubs or subshrubs, in Calif., Hawaii, and S. Amer., one or more of which has been listed for ornament, but apparently little known in cult. Fls. whitish to red or blue, in the axils of small bracts and forming verticillate racemes or spikes which may be simple or branched; calyx campanulate, about 10-nerved, enlarging in fr.; corolla-limb 4-parted, scarcely labiate; stamens 4, didynamous or nearly equal; style 2-lobed: nutlets ovoid, smooth. *S. chamædryoìdes,* Briquet (*S. campanulàta,* Benth.), from Chile, is mentioned abroad: 2–3 ft., shrubby: lvs. oblong-lanceolate, short-stalked, wrinkled: fls. pale blue, ½–⅔in. long about 2 in a whorl. B.R. 1382. Coolhouse plant.

SPHÆRÁLCEA (Greek for *globe,* and *Alcea,* the generic name of the marsh mallow). *Malvàceæ.* GLOBE MALLOW. Shrubs, subshrubs, or herbs, adapted to the warmhouse or outdoors in the far South.

Leaves frequently angled or lobed: fls. short-pedicelled, solitary, or arranged in axillary fascicles or in terminal racemes or spikes, violet or flesh-colored, rarely long-peduncled or red; bracteoles 3, free or united at base; calyx 5-cleft; staminal column divided at the top into many filaments; ovary many-celled: fr. subglobose, of many compressed, 2-valved, dehiscing, 2–3-seeded carpels, united in a ring around a central torus, from which they slowly separate.—About 65 species, 4 or 5 of which are S. African, the remainder from the warmer regions of N. and S. Amer. Several species have been mentioned in horticultural literature and occur occasionally in cult. One species has been intro. into Calif. Closely allied to Abutilon but with 3 bractlets instead of none.

3658. Sphæralcea acerifolia. (×⅙)

A. *Lvs. 5–7-lobed.*

B. *Fls. in spikes.*

acerifòlia, Torr. & Gray. Fig. 3658. Perennial herb, 2–6 ft. high: lvs. 3–4 in. long, cordate, palmately 5-lobed (sometimes with 2 or more basal lobes), coarsely serrate: fls. rose-color, varying to white, 2 in. across, 15 or more in spicate clusters terminating the branches. Rocky Mts. B.M. 5404.

BB. *Fls. in umbels.*

umbellàta, Don (*S. vitifòlia,* Benth. & Hook. *Málva umbellàta,* Cav.). Erect branched shrub, 3 ft. or more high, flocculose-tomentose: lvs. long-petiolate, cordate, somewhat 7-lobed, peltate, nerved, flat, glabrate and green above, hoary and ribbed beneath; the lobes short, acute, margin crenate: peduncles axillary, usually 3-fld., rarely 2- or 5-fld.: calyx broad-campanulate, leathery, 5-lobed, the lobes semi-ovate; petals scarlet, white at base, obcordate; filaments forming a white column. Mex. B.R. 1608. L.B.C. 3:222. Var. **trícolor,** Hort., is said to have reddish purple fls. striped with white and rose.

AA. *Lvs. 3-lobed.*

B. *Fls. scarlet or rose.*

Munroàna, Spach. Perennial herb, 1–2 ft. high: lvs. broad at base, obscurely 3-lobed, crenate, sometimes incised: fls. scarlet or rose, 1 in. across: panicles axillary and terminal, numerous. Dry plains, Brit. Col. to Idaho and south. B.M. 3537 and B.R. 1306 (both as *Malva Munroana*). A.G. 11:539. G. 35:451.—Advertised in 1890 as the "sunset plant." The same plant is said to be offered in some catalogues as *Malva miniata.*

BB. *Fls. brick-red.*

cisplátina, St. Hil. (*S. miniàta,* Spach. *Málva miniàta,* Cav. *M. miniàta,* Jacq.?). Tender branching subshrub, 2–4 ft. high, formerly considered desirable for conservatory decoration in Oct. and Nov., when it produces its brick-red fls.: lvs. 1–2 in. long, 3-lobed, coarsely and unequally crenate, midlobe longest: fls. 1–1¼ in. across, in axillary, few-fld. cymose racemes. La Plata. The above description is from B.M. 5938.—Miniata means cinnabar-red, the color of red lead. There seems to be no reason why *S. cisplatina* and *S. Munroana* should be confused. The lvs. of *S. Munroana* are obscurely 3-lobed, the lobes broad, blunt and short; the lvs. of *S. cisplatina* are deeply and sharply cut, acuminate and narrowed toward the base, the lobes narrow and acute, the midlobe over twice as long as the side lobes. The color of the fls. is very distinct and the clusters are branched in *S. Munroana* but not in *S. cisplatina.* F. TRACY HUBBARD.†

SPHÆROCÒDON (Greek, *globe* and *bell,* probably referring to the shape of the corolla). *Asclepiadàceæ.* Perennial herbs with a woody or tuberous rootstock, suitable only for the warmhouse: sts. erect, not twining: lvs. opposite, short-petioled, elliptic or oblong: fls. moderate-sized, in pedunculate sublateral umbel-like cymes; calyx 5-parted; corolla campanulate or somewhat so, 5-lobed, the lobes overlapping and slightly twisted to the left in bud; crown of 5 small fleshy compressed tubercles or teeth; column arising from the base of the corolla; anthers without appendages: fr. unknown.—Five species from Trop. and S. Afr. *S. obtusifòlium,* Benth. Rootstock woody: sts. several to a root, erect, 1–3 ft. high, branching only at the base: lvs. elliptic, usually very obtuse and apiculate, sometimes subacute: fls. in sublateral, 6–13-fld. umbel-like cymes, dark purple; sepals linear-lanceolate, acute; corolla broadly campanulate, 5-lobed to one-third of the way down or more. Trop. and S. Afr. B.M. 7925.

SPHÆRÓGYNE: *Tococa.*

SPHÆROSTÉMA: *Schizandra.*

SPHAGNUM. Sphagnum moss, bog-moss, or peat-moss is found in swamps or bogs and is one of the plants from which peat is formed; it is much used by gardeners. Its geographical distribution extends to all countries in the North Temperate zone. According to Warnstorf, 1911 (Engler's "Das Pflanzenreich"), there are 342 recognized species of Sphagnum, of which many occur in North America. Sphagnum mosses differ from the true mosses so much that they are usually classified in a distinct family, Sphagnaceæ. Besides differences in structure of the reproductive organs, the marked differences lie in the

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CVI. Spinach.—Above, a plant of Long Season variety. Below, spinach field near Norfolk, Virginia.

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larger growth of sphagnum (which is often a foot or more in height), its soft appearance, pale green color, and the absence of root-hairs. The stems and leaves are inclosed or encircled by one, two, and often four strata of transparent cells connected with each other by small holes, which have the capacity of sucking up and retaining a large amount of water. These cells therefore perform the function of root-hairs, and it is this abundant water-storage tissue that makes sphagnum moss of so much use to gardeners in the cultivation of orchids, anthuriums, and the like, and in fact most plants of an epiphytal or swamp-loving character, such as sarracenia and darlingtonia. Sphagnum often forms at least one-third of the compost in which pitcher-plants and epiphytes are grown. The fresh green tips of sphagnum are also most useful for surfacing pots of orchids and other plants. Besides giving them a better appearance, the moss acts as an index to the moisture condition of the plant. Sphagnum is also useful in the propagation of many stove plants, such as cordyline, nepenthes, and the like; for starting tropical tuberous-rooted plants, such as fancy caladiums; for sowing seeds of orchids, anthuriums, nepenthes, and sarracenias when fresh and chopped fine; as a mulch; as a non-conducting material for plants in pots in exposed positions in summer; and in packing plants for transportation, for which purpose it is an ideal material. Owing to its sponge-like character it may be used wet or dry, according to the character of the plants intended for packing.

Unless one has an ideal position in which to keep sphagnum moss after gathering it from its native place, or unless one has conditions very similar to its native habitat, it is difficult to keep it living for any length of time. This does not greatly matter, except that sphagnum used for surfacing pots should always be living for the sake of appearance. That which is used in potting and propagating need not necessarily be living as long as it is fresh and not decayed, while partially decayed moss may be used for mulching and packing.

EDWARD J. CANNING.

SPHEDAMNOCÁRPUS (derivation unknown). *Malpighiàceæ*. Scandent or erect shrubs or subshrubs: lvs. opposite, entire, petiolate, without stipules, the petiole glandular: fls. rather large, in 3–4-fld. umbels, collected in terminal panicles; calyx 5-parted, not glandular; petals unequal, short-clawed, the lobes dentate or nearly entire; stamens 10; ovary 3-celled: samaras 3, with a vertical dorsal wing.—About 5 species, Trop. and S. Afr. *S. prùriens*, Szyszylowicz (*Acridocárpus prùriens*, Juss.). A tall climbing shrub, silky-tomentose on most of its parts: lvs. opposite, ovate-oblong, 1–4 in. long: fls. subcorymbosely clustered at the ends of the branches, 1–1½ in. diam., golden yellow; petals short-clawed, orbicular, margins crisped: samaras silky-pubescent. S. Afr. B.M. 7894.

SPHENÓPHOLIS (Greek, *sphen*, a wedge, and *pholis*, a scale, referring to the broadly obovate second glume). Syn., *Eatònia*, Endl., not Raf. *Gramìneæ*. Slender perennials with rather delicate panicles: spikelets 2–3-fld., articulated below the glumes; glumes dissimilar in shape, the first narrow, the second obovate. —Species about 5, N. Amer. Three kinds have been catalogued among native plants offered for sale.

A. *Panicle dense, spike-like, strict.*

obtusàta, Scribn. Spikelets crowded on the short, erect panicle-branches; upper glume rounded-obovate, very obtuse. Dry soil throughout U. S. Dept. Agric., Div. Agrost. 7:258.

AA. *Panicle more loose and slender.*

pállens, Scribn. (*Eatònia pennsylvánica*, Gray). Lvs. 3–6 in. long: panicle-branches lax, nodding, glumes unequal, the first shorter. Moist woods and meadows. Maine to Texas. Ibid. 257.

nítida, Scribn. (*Eatònia Dúdleyi*, Vasey). Lvs. 1–2 in. long: panicle-branches spreading in flowering, afterward erect; glumes equal in length. E. U. S. Ibid. 259.

A. S. HITCHCOCK.

SPICE BUSH: *Benzoin.*

SPIDER FLOWER: *Cleome.* **S. Lilies:** *Hymenocallis* and *Pancratium.* **S. Plant:** *Cleome.* **Spiderwort:** *Tradescantia.*

SPIGÈLIA (named for Adrian von der Spigel, physician, 1558–1625). *Loganiàceæ*. Annual or perennial herbs, some hardy, the others either warmhouse or greenhouse plants, rarely somewhat woody, with opposite membranous feather-veined rarely 3–5-nerved lvs., and long or small, red, yellow, or purplish fls. usually borne in terminal one-sided somewhat curved spikes: calyx 5-lobed; segms. narrow; corolla tubular; lobes 5, valvate; stamens 5, attached to the corolla-tube; ovary 2-loculed; style articulated, simple, obtuse or somewhat capitate and stigmatose at the summit: caps. flattened, circumscissile above the persistent base.—About 50 species, Amer.

marilándica, Linn. PINK-ROOT. A handsome hardy perennial herb, with slender, tufted sts. 1–2 ft. high, opposite, ovate, sessile, thin lvs. 2–4 in. long, and red, tubular fls. with yellow throats in terminal, 1-sided spikes. June, July. Woods, N. J. to Wis. and south. B.B. 2:605. B.M. 80.—An elegant plant for the hardy border. Shade is not necessary for its welfare if planted in good loose deep loam.

S. splèndens, Hort., grows 1½ ft. high: lvs. 4–5 in. long, contracted to a short petiole, obovate-oblong: fls. bright scarlet, 1 in. or more long, in recurved spikes. July. Mex. and Guatemala. B.M. 5268. G.W. 2, p. 417; 7, p. 362.

F. W. BARCLAY.

SPILÁNTHES (Greek, meaning *spot-flower*, in reference to the markings on the disk in some of the species). *Compósitæ*. Herbs, mainly weeds, some of them desirable for outdoor planting, with opposite lvs.: rays yellow or whitish, or none: achenes nearly always flattened, biaristate or without bristles, glabrous or strongly ciliate, in the latter case quite distinct in appearance. There are about 40 species of Spilanthes, widely distributed in both hemispheres, mostly confined to warmer countries, or, in the New World, also occurring in the South Temperate zone; one variety native to Amer. Good technical characters for distinguishing the different forms are found in but few cases. The latest monograph is in the Proceedings of the American Academy of Arts and Sciences, vol. 42, pp. 521–69. **S. oleràcea**, Linn. (Tropics), is cult. for the pungent flavor of its lvs., used in salads; also, to a slight extent, as an ornamental, on account of its odd cylinder-like heads, in which the ratio of length to breadth is the greatest in the genus. Two types of it are named in the trade, Parà cress and Brazil cress, the latter said more commonly to have a brownish cast to sts. and lvs. Gn. 22, p. 295. Gt. 2, p. 36. While most of the species are of inferior appearance, several are distinctly worth cultivating or possibly hybridizing for ornament. The principal ones are enumerated below; all but *S. callimorpha* belonging in the radiate section, Acmella, DC.

S. americàna, Hieron., var. *rèpens*, A. H. Moore. One of the best of the showy members of the genus. Erect or weak, ascending, decumbent, or rarely prostrate: lvs. large for the genus: rays bright yellow. By selection the erect type could probably be made to predominate. A hybrid combining with this the handsome lvs. and red st. of S. phaneractis would be most pleasing, were it produceable. Sept. Mo., Ark., La. to Fla. and Texas.—*S. callimórpha*, A. H. Moore. Decumbent or prostrate: lvs. long-acuminate; internodes long: rayless species, but of pleasing appearance. Yunnan Province, China.—*S. charitópsis*, A. H. Moore. One of the dainty species; a fair companion-piece to S. iodiscæa, but with pale disks. Brazil.—*S. fílipes*, Greenm. Erect plant with long internodes: small attractive heads. Yucatan, Mex.—*S. grísea*, A. H. Moore. Lvs. densely hispidulous: rays large, very bright yellow. Paraguay.—*S. iodiscæa*, A. H. Moore. A dainty little plant, with delicate green foliage: disk violet, the tiny rays creamy. Porto Rico. Though not quite so charming, S. charitopsis would be a pretty good companion.—*S. phaneráctis*, A. H. Moore. Decumbent or

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prostrate: sts. red: lvs. linear to linear-lanceolate: rays large, bright yellow. Known from states of Jalisco and Michoacan, Mex. One of the few very conspicuous-fld. species.—*S. poliolepidica*, A. H. Moore. Erect: rays golden yellow: plants hairy. Costa Rica.

ALBERT HANFORD MOORE.

SPINACH (*Spinacia oleracea*, which see) is an annual crop grown as a pot-herb, or for "greens." Fig. 3659. It is a cool-season plant, and therefore it is grown in fall to spring. It is a plant of easy culture, thriving in any good garden or field soil, although for quick results and for tender succulent foliage, land that has an abundance of available plant-food, and particularly of nitrogen, is most desirable. The plant is hardy, and when the land is well drained, it will ordinarily stand the winter climate as far north as the city of New York, and still farther in somewhat protected places.

Spinach is grown both as a fall and spring crop. The fall crop is raised from seed that is sown in August; in eight weeks the leaves may be large enough for eating.

3659. Spinach.

The spring crop is grown from seeds sown in autumn, or from those sown in winter in hotbeds or coldframes, or from those sown directly in the open ground as soon as it is fit in the spring. If the plants for spring use are to be started in the fall, the seeds should be sown about six to eight weeks before hard freezing weather is expected. Then the plants will have attained sufficient size and roothold to enable them to pass the winter. It is advisable to cover the plants, just before winter sets in, with straw or loose litter or dry manure. Even though the plants will withstand the winter, they nevertheless thrive better if given this protection, particularly in soils that are likely to heave. It is customary to grow this fall-sown spinach on wide ridges or beds that are made by plowing several furrows together, leaving a dead-furrow between them. This allows of surface drainage. These beds may be from 5 to 10 feet wide. On these beds, the seeds are sown in rows running lengthwise, the distance between the rows being from 10 to 20 inches, depending on the methods that are employed for tillage. If hand tillage alone is to be given, the plants may be placed closer. In the spring the cover is removed from the plants at the earliest opportunity, for spinach is most desired very early in the season. Unless the land is in extra good "heart," it is well to make a surface application of a soluble fertilizer early in the spring in order to start the plants into growth. A fertilizer that is very rich in nitrogen gives best results; in fact, it is customary in some places to use a solution of nitrate of soda or sulfate of ammonia, applying the material with a sprinkling-cart. From fifty to seventy-five pounds of the fertilizer may be used to the acre with very good results at each of two or more applications.

For home use, spinach is sometimes carried over the winter in frames, the plants having been transplanted to the frames or raised in them during the late fall. These frames are protected from severe freezing weather by mats or shutters. Whenever it is desired to bring the plants into growth, sash is placed over the frame, and extra protection is given in very cold weather. The plants will soon become green and begin to make new leaves. Different frames may be covered at different times as the season advances, thereby providing a supply for home use. Sometimes the seed is sown in hotbeds that are made late in winter or very early in spring, and the plants are secured in advance of the ordinary season. The growing of spinach in frames is less frequent than formerly, owing to the fact that the market is now supplied with the product grown in the middle South.

Spring spinach may be grown from seeds that are sown as soon as the land can be worked in spring. If the land has been plowed and manured in the fall, quicker results may be secured. Two or three sowings may be made in the home-garden for spring use, but after the middle of June spinach is likely to become tough and is in little demand. If spinach is wanted during the summer, it is better to use the New Zealand spinach, which is a warm-weather plant. This plant has no relationship with the ordinary spinach (see *Tetragonia*). It is usually best to sow spinach seed where the plants are to stand, although it is sometimes transplanted into frames for home use. Care must be taken that the plants do not become checked or stunted, else they will tend to run to seed. If the seed is sown too late in spring, when hot weather is approaching, the root-leaves will be very few and the plant will quickly throw up flower-stalks. Spinach is always grown as a succession or companion crop, as it occupies the land for a small part of the year. There are very few insects and diseases that are generally troublesome.

Spinach is usually transported to market in barrels or crates. Plants are usually cut so that an inch or so of the root is left with them. All dirt is removed, as also all broken and dead leaves. The plants are packed tight. It is essential that the plants be dry before they are shipped.

There are several important varieties of spinach. The large broad-leaved varieties are most popular in the markets, such as the Viroflay and the Round-leaved. The prickly spinach is considered to be the most hardy and is chiefly recommended for fall sowing. L. H. B.

SPINÀCIA (from *spina;* alluding to the spiny fruit). *Chenopodiàceæ*. SPINACH. SPINAGE. According to Volkens (in Engler & Prantl's "Pflanzenfamilien"), there are only two species of Spinacia, *S. oleracea*, Linn., the common spinach, and *S. tetrandra*, Stev., although Bentham & Hooker had made the genus to include four species. *S. tetrandra* is an anual herb of the Asia Minor-Persian region, and is not in cultivation. *S. oleracea*, the spinach, is probably native to southwestern Asia, and it is now widely cultivated. It is an annual herb, developing rather large arrow-shaped root-leaves, and these leaves are eaten for "greens." Later in the season it sends up a branching flower-stem 2 to 3 feet high, bearing axillary clusters of seed-like fruits. In one type these fruits are spiny: this is the form once described as *S. spinosa*, Moench, but which is not now considered to be specifically distinct. Whether the round-seeded or the prickly-seeded type is the original form of the spinach is not known, but as a matter of nomenclature, Linnæus' *S. oleracea*, which is the oldest name, is held to include all.

Spinacia belongs to the Atriplex tribe. The genus is distinguished from Atriplex in the fact that the pistillate flowers are bractless, whereas those of Atriplex are inclosed in a pair of enlarging calyx-like bracts. Spinacia is dicœcious, bearing the flowers in small axillary clusters; stamens 4 or 5, in a 4- to 5-lobed calyx; ovary 1, with 4 to 5 styles or stigmas, in a 2- to 4-toothed calyx, this calyx hardening and inclosing the achene and often becoming horned on the sides and giving rise to "prickly-seeded" spinach. The cultivated forms have developed much thicker and broader radical leaves, which are used for greens, often showing little of the halberd or sagittate shape. See *Spinach*. L. H. B.

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SPIRÆA (ancient Greek name of a plant used for garlands, derived from *speira*, band, wreath; probably first used for the present genus by Clusius). *Rosàceæ*, subfam. *Spiræeæ*. SPIREA. Ornamental woody plants grown for their profuse handsome white, pink, or carmine flowers.

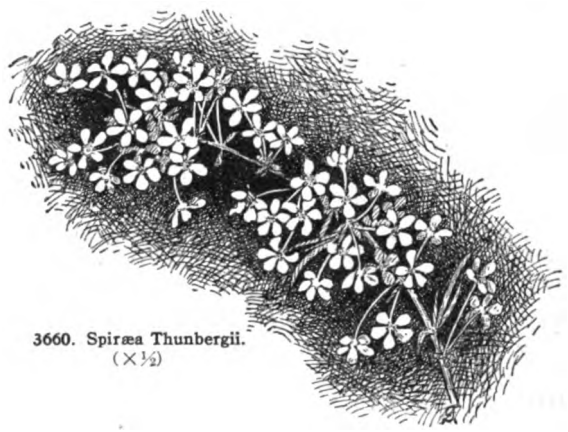
Deciduous shrubs: lvs. simple, short-petioled, dentate or serrate, sometimes lobed, rarely entire, without stipules: fls. in umbel-like racemes, corymbs or panicles, perfect, rarely polygamous; calyx cup-shaped or campanulate, 5-lobed; petals 5, rounded; stamens 15–60, inserted between calyx and disk; pistils usually 5, distinct, developing into follicles dehiscent along the inner suture, with several minute oblong seeds.—About 70 species in the temperate regions of the northern hemisphere, in Amer. south to Mex., in Asia south to the Himalayas. Many species formerly included under Spiræa are now referred to other genera; see *Physocarpus*, *Holodiscus*, *Sorbaria*, also *Chamæbatiaria*, *Luetkea*, *Petrophytum*, and *Sibiræa* for shrubby species, and *Aruncus*, *Filipendula*, and also *Astilbe* for the herbaceous ones. There is a monograph of Spiræa and the allied genera by Maximowicz in Acta Horti Petropolitani, vol. 6, pp. 105–261 (1879) and a monograph of the cult. species, with their numerous hybrids fully described by H. Zabel, Die strauchigen Spiräen der deutschen Gärten (1893). There is much horticultural literature on spireas, for the plants are popular and about two-thirds of the known species and numerous hybrids mostly originated in gardens are in cult.

The spireas are very ornamental, usually low or medium-sized shrubs with rather small deciduous foliage and with small white or pink or sometimes nearly crimson flowers in showy corymbs or panicles followed by small inconspicuous capsule-like fruits. Many are hardy North; some of the best of them are *S. arguta*, *S. Thunbergii*, *S. Vanhouttei*, *S. pubescens*, *S. trilobata*, *S. nipponica*, *S. media*, *S. ulmifolia*, *S. alba*, *S. Douglasii*, *S. Menziesii*, *S. tomentosa*. The recently introduced *S. Henryi*, *S. Veitchii*, *S. Wilsonii*, *S. Rosthornii* and *S. Sargentiana* have proved hardy at the Arnold Arboretum, while *S. blanda*, *S. japonica*, and *S. albiflora* require a sheltered position or protection during the winter, though *S. japonica* and its allies, even if killed almost to the ground, will produce flowers on shoots of the same season. *S. cantoniensis*, *S. Blumei*, *S. chinensis*, *S. canescens*, and *S. bella* are more tender and not to be recommended for the North, but are hardy or nearly hardy in the middle states. *S. prunifolia* is hardy as far north as Boston.

In regard to the flowering season, the spireas can be divided into two groups. The first one contains the species of the section Chamædryon, with white flowers in umbels and blooming in spring, from April to June. The second group is composed of the sections Calospira and Spiraria, with white or pink flowers in corymbs or panicles appearing from June to autumn. Some of the most important species, arranged according to their relative flowering-time, are the following: Early-flowering spireas—*S. Thunbergii*, *S. arguta*, *S. hypericifolia*, *S. prunifolia*, *S. media*, *S. pikowiensis*, *S. pubescens*, *S. chamædryfolia*, *S. trilobata*, *S. Vanhouttei*, *S. cantoniensis*, *S. nipponica*. Late-flowering spireas—*S. bella*, *S. Rosthornii*, *S. Wilsonii*, *S. Henryi*, *S. Sargentiana*, *S. Veitchii*, *S. corymbosa*, *S. densiflora*, *S. canescens*, *S. japonica*, *S. albiflora*, *S. salicifolia*, *S. alba*, *S. Menziesii*, *S. Douglasii*, *S. tomentosa*. Many species of the second group do not produce their flowers all at once like those of the first group, but continue blooming for a longer time.

The spireas are all medium-sized or low shrubs and well adapted for borders of shrubberies, as single specimens on the lawn, or for rockeries. Especially the species of the early-flowering group possess a graceful habit and make effective single specimens, except perhaps *S. chamædryfolia* and *S. media*, which are somewhat stiffer and less handsome and produce suckers. *S. canescens*, *S. Henryi*, and its allies have the graceful habit of the first group. *S. japonica* and its numerous hybrids form mostly low, round bushes and are pretty as single specimens or in the border. *S. alba*, *S. Douglasii*, *S. Menziesii*, and their hybrids should be planted in shrubberies only and especially in situations where their spreading by suckers does no harm; they are sometimes used for low ornamental hedges. For rockeries *S. decumbens*, *S. betulifolia*, *S. corymbosa*, *S. densiflora*, *S. bullata*, and some dwarf hybrids of *S. japonica* are to be recommended.

The species of the section Chamædryon, and also *S. canescens* and *S. bella*, should be pruned as little as possible—only thinned out and the weak wood removed—while those of the sections Spiraria and Calospira can be pruned more severely if necessary, since they produce their flowers at the ends of the young shoots. Some



3660. Spiræa Thunbergii. (×½)

of the early-flowering spireas, especially *S. arguta*, *S. prunifolia*, *S. Vanhouttei*, and *S. Bumalda*, are sometimes forced.

The spireas grow in almost any moderately moist soil and do not stand drought well, the spiraria species being generally more moisture-loving; *S. tomentosa* thrives well only in a peaty or sandy soil, while those recommended above for rockeries require a well-drained soil and sunny situation. Propagation is by seeds sown in spring and covered only slightly with soil, or by hardwood or greenwood cuttings. The species of Chamædryon grow very well from greenwood cuttings under glass, while the spirarias are usually raised from hardwood cuttings. The calospiras seem to grow equally well in both ways. The spirarias are also often propagated by division and by suckers.

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KEY TO THE SECTIONS.

A. *Infl. a simple umbel-like raceme: fls. white.*
Section I. CHAMÆDRYON. Species Nos. 1–20.

AA. *Infl. compound: fls. white or pink.*
B. *Fls. in corymbs.*
Section II. CALOSPIRA. Species Nos. 21–42.

BB. *Fls. in panicles.*
Section III. SPIRARIA. Species Nos. 43–55.

Section I. CHAMÆDRYON. Species Nos. 1–20.

A. *Fls. in sessile umbels with none or very small lvs. at the base or only the lower umbels on leafy stalks.*
B. *Foliage entire or crenately dentate only near the apex, often 3-nerved, grayish green* ..... 1. **hypericifolia**
BB. *Foliage dentate or serrate, usually penninerved, bright green.*
C. *Shape of lvs. linear-lanceolate: glabrous* ..... 2. **Thunbergii**
CC. *Shape of lvs. ovate to oblong-lanceolate: finely pubescent when young.*
D. *Umbels on the lower part of the branches stalked.*
E. *Lvs. oblong* ..... 3. **arguta**
EE. *Lvs. obovate* ..... 4. **multiflora**
DD. *Umbels all sessile, 3–6-fld.* ..... 5. **prunifolia**
AA. *Fls. in umbel-like racemes on leafy stalks.*
B. *Margin of lvs. entire or crenate or dentate only toward the apex.*
C. *Foliage grayish pubescent on both sides* ..... 6. **cana**
CC. *Foliage almost glabrous.*
D. *Shape of lvs. elliptic to oblong-lanceolate.*
E. *Lvs. penninerved: shoots angular* ..... 7. **alpina**
EE. *Lvs. all or partly 3-nerved.*
F. *Shoots striped: lvs. all 3-nerved* ..... 8. **crenata**
FF. *Shoots terete: lvs. partly penninerved, partly 3-nerved* ..... 9. **pikowiensis**
DD. *Shape of lvs. almost orbicular, ½–1 in. broad* ..... 10. **nipponica**
BB. *Margin of lvs. incisely serrate and often slightly lobed (only in No. 18 sometimes entire).*
C. *Stamens shorter than or as long as petals; sepals erect or spreading in fr.*
D. *Foliage glabrous.*
E. *Form of lvs. orbicular to ovate.*
F. *Apex of lvs. obtuse.*
G. *Lvs. penninerved, ovate...* 11. **Blumei**
GG. *Lvs. palmately 3–5-nerved, orbicular* ..... 12. **trilobata**
FF. *Apex of lvs. acute* ..... 13. **Vanhouttei**
EE. *Form of lvs. rhombic-lanceolate* ..... 14. **cantoniensis**
DD. *Foliage pubescent, at least beneath.*
E. *Umbels and follicles pubescent.*
F. *Tomentum grayish* ..... 15. **blanda**
FF. *Tomentum yellowish* ..... 16. **chinensis**
EE. *Umbels and follicles glabrous.* 17. **pubescens**
CC. *Stamens longer than petals; sepals reflexed.*
D. *Shoots terete, often pubescent....* 18. **media**
DD. *Shoots angular, glabrous.*
E. *Lvs. doubly and irregularly serrate from below the middle* ..... 19. **chamædryfolia**
EE. *Lvs. simply serrate, usually only above the middle.....* 20. **flexuosa**

1. **hypericifòlia,** Linn. Vigorous shrub, 5 ft. high, with slender arching or upright branches: lvs. almost sessile, cuneate-obovate to obovate-lanceolate, 3-nerved or with few lateral veins, almost glabrous, ¾–1½ in. long: fls. small, white, in sessile umbels; pedicels usually pubescent; petals almost orbicular, usually longer than stamens. April, May. S. E. Eu. to Siberia. —Variable species. Var. **acùta,** Ser. (*S. acutifòlia,* Willd.). Lvs. narrower, oblanceolate: fls. smaller, yellowish white; pedicels glabrous; petals obovate, shorter than stamens: fls. somewhat earlier, but less showy. G.O.H. 9. Var. **flabellàta,** Zabel (*S. flabellàta,* Bertol. *S. hypericifòlia* var. *crenàta,* Boiss. & Buhse). Lvs. obovate to obovate-lanceolate, acute, incisely serrate at the apex or entire on the flowering branches. Var. **obovàta,** Maxim. (*S. obovàta,* Waldst. & Kit.). Lvs. obovate, rounded at the apex, crenate above the middle. S. E. Eu. G.O.H. 11. Var. **truncàta,** Zabel (*S. thalictroìdes,* Hort., not Pall.). Lvs. broadly obovate to oblong-obovate, truncate and crenately dentate at the apex. Siberia.

2. **Thúnbergii,** Sieb. Fig. 3660. Shrub, 5 ft. high, with spreading or arching branches: lvs. linear-lanceolate, sharply serrulate, 1–1¾ in. long: fls. pure white, about ⅓in. across, in 3–5-fld. naked umbels; petals

3661. Spiræa prunifolia var. plena. (×½)

obovate, much longer than stamens: follicles with the spreading styles below the apex. April, May. China, Japan. S.Z. 1:69. G.F. 8:84, 85. J.H. III. 47:337.—A very graceful early-flowering shrub, the slender arching branches clothed with feathery bright green foliage, turning late in fall to orange or scarlet. Almost hardy, but tips of branches sometimes killed by severe frost; valuable for seaside planting.

3. **argùta,** Zabel (*S. Thúnbergii* × *S. multiflòra*). Similar in habit to the former but higher and more vigorous: lvs. oblong-obovate to oblong-oblanceolate, sharply and sometimes doubly serrate, glabrous at length, 1–1¾ in. long: fls. pure white, ⅓in. across, in many-fld. umbels, mostly with small lvs. at the base; pedicels glabrous; petals broadly obovate, almost twice as long as stamens. May. Of garden origin. G.C. III. 22:3; 43:398. Gn. 73, p. 578; 78, p. 82. A.G. 22:633. G.M. 44:385.

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A.F. 17:192. Gn.W. 24:470. G.L. 27:33. Gng. 7:291. F.E. 11:160. G.F. 10:443. M.D.G. 1900:16.—The most free-flowering and showy of the earlier spireas; quite hardy.

4. **multifiòra,** Zabel (*S. crenàta* × *S. hypericifòlia*). Shrub, 5 ft. high, with slender, arching branches: lvs. obovate, cuneate, serrate above the middle, usually 3-nerved, glabrous at length, about 1 in. long: fls. pure white, in many-fld. umbels, sessile on the upper, borne on leafy stalks on the lower part of the branches. May. Of garden origin.—Handsome shrub similar to the former, but blooming a little later.

5. **prunifòlia,** Sieb. & Zucc. Graceful shrub, 6 ft. high, with upright slender pubescent branches: lvs. ovate to oblong, denticulate, pubescent beneath, 1–2 in. long: fls. pure white, about ½in. across, on slender pedicels, in 3–6-fld. umbels; petals obovate, longer than stamens. May. China, Japan. J.C.T. 22:12. Var. **plèna,** Schneid. (var. *flòre-plèno*, Hort.). Fig. 3661. Fls. double, rather large. S.Z. 1:70. F.S. 2:153. Gn. 53, p. 185. A.G. 18:425. F.E. 9:593. Mn. 3, p. 42. G. 21:314; 27:132. G.M. 50:187. Gn.M. 3:208. F.E. 31:602.—Very handsome, early-flowering shrub, with dark green, shining foliage, turning orange in fall. The single-fld. form is less showy and rare in cult.; its foliage is lighter and not shining.

6. **càna,** Waldst. & Kit. Dense, bushy shrub, 3 ft. high: lvs. elliptic to oblong, acute at both ends, usually entire, grayish pubescent on both sides, more densely beneath, ⅓–1 in. long: fls. ¼in. across, in dense head-like umbels; petals about as long as stamens; sepals reflexed in fr. May. S. E. Eu., W. Asia. R.F.G. 24:148.—Hardy, but not very showy.

7. **alpìna,** Pall. Shrub, 4 ft. high, with upright or arching, angular, reddish brown branches: lvs. oblong-obovate to oblanceolate, acute, usually entire, glabrous, penninerved, ¼–1 in. long: fls. white, rather small, in short-stalked, small, glabrous umbels; petals roundish, little shorter than stamens; sepals upright in fr.: follicles curving outward. May, June. N. E. Asia. G.O.H. 8.—Hardy shrub, with graceful foliage.

8. **crenàta,** Linn. (*S. crenifòlia*, C. A. Mey.). Shrub, 3 ft. high, with slender striped branches: lvs. oblong-obovate to oblanceolate, acute at both ends, crenately serrate toward the apex, grayish green, puberulous beneath when young, 3-nerved, ½–1¼ in. long: fls. white, rather small, in dense almost semi-globose umbels; petals roundish obovate, shorter than stamens; sepals upright in fr.: follicles with erect styles. May. S. E. Eu. to Caucasus and Altai. L.B.C. 13:1252. G.O.H. 10. R.F.G. 24:147.—Hardy.

9. **pikowiénsis,** Bess. (*S. crenàta* × *S. mèdia*. *S. Nicoudiértii*, Hort.). Shrub, 4 ft. high, with terete upright branches: lvs. oblong, cuneate at base, with few sharp teeth at the apex or sometimes entire, penninerved to 3-nerved, almost glabrous, 1–2 in. long: fls. white or greenish white, in many-fld. almost glabrous umbels; petals orbicular, shorter than stamens; sepals upright in fr.: follicles with the upright style somewhat below the apex. May.—Supposed natural hybrid, found wild in Podolia, Poland.

10. **nippónica,** Maxim. (*S. bracteàta*, Zabel, not Raf.). Fig. 3662. Shrub, 8 ft. high, with upright or spreading branches, quite glabrous: lvs. obovate, usually crenate at the apex, dark green above, bluish green beneath, of firm texture, ½–¾in. long: fls. ⅛in. across, in umbel-like racemes, sometimes compound at the base; petals orbicular, longer than stamens; sepals spreading in fr. June. Japan. Var. **rotundifòlia,** Makino (*S. mèdia* var. *rotundifòlia*, Nichols.). Lvs. broadly obovate or roundish obovate, ¾–1½ in. long: fls. somewhat larger. G.C. II. 23:283; III. 37:149; 43:399. J.H.S. 33, p. 349. G. 29:663. G.M. 43:95. B.M. 7429. G.F. 7:305 (adapted in Fig. 3662).—Desirable hardy shrub of vigorous growth with showy umbels of pure white fls. and dark green handsome foliage remaining green until late in fall.

11. **Blùmei,** Don (*S. rupéstris*, Sieb.). Shrub, 4 ft. high, with spreading and arching branches: lvs. ovate to rhombic-ovate, incisely crenate-serrate, pale bluish green beneath and rather prominently veined, ¾–1¼

3662. Spiræa nipponica. (× nearly 1)

in. long: fls. polygamous, white, in many-fld. umbels; petals roundish-obovate, about as long as stamens: follicles with spreading or reflexed styles. June. Japan. B.H. 8:36.—Not hardy N., rare in cult.; often the following or other species are met with under its names.

12. **trilobàta,** Linn. (*S. triloba*, Linn.). Fig. 3663. Shrub, 4 ft. high, with slender spreading branches: lvs. almost orbicular, incised-dentate and often 3-lobed, obtuse, pale bluish green beneath, ½–1 in. long: fls. pure white, in many-fld. umbels; sepals upright in fr.: follicles with ascending styles. May, June. N. China to Siberia and Turkestan. L.B.C. 13:1271. G.F. 1:452. F.E. 30:45 (as *S. cratægifolia*).—Handsome bushy shrub, quite hardy; cult. under many different names as *S. aquilegifòlia*, *S. adiantifòlia*, *S. cratægifòlia*, *S. Blùmei*.

13. **Vanhoùttei,** Zabel (*S. cantoniénsis* × *S. trilobàta*. *S. aquilegifòlia* var. *Vanhoùttei*, Briot). Fig. 3664. Shrub, 6 ft. high, with arching branches: lvs. rhombic-ovate or rhombic-obovate, rounded or somewhat narrowed at the base, acute, incised-serrate, dark green above, pale bluish green beneath, ¾–1¾ in. long: fls. white, ⅓in. across, in many-fld. umbels; petals twice as long as stamens; sepals upright or spreading in fr. May, June. Of garden origin. Gn. 53, p. 251; 71, p. 334. Gn.M. 1:116; 3:131. G. 27:94. F.R. 10:133. F.E. 14:389; 17:673; 31:600. C.L.A. 4:210. G.F. 2:317. Gng. 5:210. A.G. 15:297. P.G. 3:173. M.D.G. 1900:17.—This is one of the most beautiful, or perhaps the most beautiful, of the early-blooming spireas and quite hardy. Sometimes confounded with the foregoing, which is similar but smaller in every part and less showy.

14. **cantoniénsis,** Lour. (*S. Reevesiàna*, Lindl. *S. lanceolàta*, Poir. *S. corymbòsa*, Roxbg.). Shrub, 4 ft. high, with slender, arching branches: lvs. rhombic-lanceolate, incisely doubly serrate, dark green above,

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pale bluish green beneath, 1–2½ in. long: fls. over ⅓in. across, in rather dense umbels; sepals upright in fr.: follicles with spreading styles. May, June. China, Japan. B.R. 30:10. A.G. 18:356. G. 34:441.—Very handsome shrub, with large pure white fls., but only half-hardy N. Var. **lanceàta,** Zabel (*S. Reevesiàna flòre-plèno*, Hort.), with double fls. and narrower lvs. is still more tender. H.F. 1855:11. This species and the three foregoing are valuable also for their handsome foliage, which remains fresh and green until late in fall.

15. **blánda,** Zabel (*S. chinénsis* × *S. cantoniénsis. S. Reevesiàna robústa* or *nòva*, Hort.). Upright shrub, 6 ft. high, with arching branches: lvs. oblong to ovate, acute at both ends, incised-serrate, dark green and almost glabrous above, grayish-tomentose beneath, 1–1⅓ in. long: fls. rather large, pure white, in pubescent umbels; sepals ovate-lanceolate, upright in fr.: follicles pubescent, with spreading styles. May, June. Of garden origin.—Only half-hardy North.

16. **chinénsis,** Maxim. (*S. pubéscens*, Lindl.). Upright shrub, 5 ft. high, with arching branches, tomentose when young: lvs. long-petioled, ovate, incisely serrate and sometimes 3-lobed, finely pubescent above, yellowish tomentose beneath, 1–2 in. long: fls. pure white, about ⅓in. across, in pubescent umbels; sepals upright in fr., ovate-lanceolate, tomentose like the follicles; styles terminal, spreading. May. China. B.R. 33:38.—Handsome, but not hardy North.

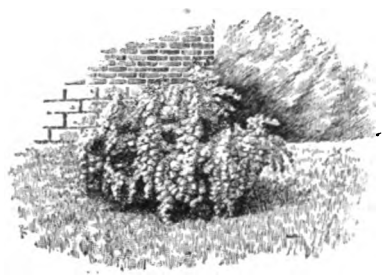
17. **pubéscens,** Turcz. Upright shrub, 6 ft. high, with slender, arching branches: lvs. similar to those of the foregoing species, but more grayish tomentose beneath and somewhat smaller, petioles shorter: fls. ¼–⅓in. across, in glabrous umbels; sepals triangular-ovate, upright in fr.: follicles glabrous, with the spreading styles below the apex. May. N. China. G.F. 1:331.—Hardy N., and the large-fld. form as handsome as the foregoing species.

18. **mèdia,** Schmidt (*S. confùsa*, Regel & Koern.). Upright shrub, 5 ft. high, with terete branches, glabrous or pubescent when young: lvs. ovate to oblong,

3663. Spiræa trilobata. (×½)

cuneate at the base, incisely serrate above the middle, almost glabrous or pubescent, 1–2¼ in. long: fls. in many-fld. rather long-stalked, umbel-like racemes: follicles with the spreading or reflexed styles somewhat below the apex. May. S. E. Eu. to Japan. J.H. III. 46:533. G. 30:45. G.M. 49:504. R.F.G. 24:149. Var. **glabréscens,** Simonkai. Almost glabrous. Var **subintegérrima,** Zabel (*S. oblongifòlia*, Waldst. & Kit.). Lvs. elliptic-oblong to oblong-lanceolate, narrowed at both ends, entire or with 1–3 teeth at the apex, nearly glabrous. Var. **sericea,** Regel (*S. sericea*, Turcz.). Lvs. pubescent on both sides.

19. **chamædryfòlia,** Linn. Shrub, to 6 ft., with angular glabrous branchlets: lvs. slender-petioled, ovate, incisely or doubly serrate from below the middle, almost glabrous, bluish green beneath, 1½–3 in. long: umbels many-fld., the lower ones on branchlets about 2 in. long, the upper ones often almost sessile; fls. about ⅓in. across: follicles with the style upright and terminal. May, June. S. E. Eu. to Japan. G. W. H. 83. Var. **ulmifòlia,** Maxim. (*S. ulmifòlia*, Scop.). Lvs. more rounded at the base: umbels more elongated-hemispherical. S. E. Eu. R.F.G. 24:150. Var. **tránsiens,** Zabel. Lvs. narrower, oblong-ovate.—This and the preceding species spread by suckers.



3664. Spiræa Vanhouttei.

20. **flexuòsa,** Fisch. (*S. chamædryfòlia* var. *flexuòsa*, Maxim.). Similar to the preceding species, but lower and more spreading: branchlets slender, strongly angled, distinctly zigzag: lvs. oblong-ovate to lance-oblong, cuneate at the base, usually serrate above the middle only, 1–2 in. long: umbels few-fld., short-stalked. May, June. N. E. Asia. Var. **stenophýlla,** Schneid. (*S. chamædryfòlia* var. *stenophýlla*, Zabel). Lvs. smaller and narrower, usually less than 1 in. long.

Section II. Calospira. Species Nos. 21–42.

A. *Corymbs on usually short lateral branchlets along the mostly arching branches of the previous year.*
  B. *Lvs. ½–1 in. long, crenate-serrate, or serrate only at the apex: corymbs on very short branchlets.*
    C. *Branchlets angular: lvs. generally oval, obtuse: winter buds with 2 outer scales* ..... 21. **canescens**
    CC. *Branchlets terete: lvs. generally oblong: winter buds with several scales* ..... 22. **Sargentiana**
  BB. *Lvs. ¾–3 in. long.*
    C. *Fls. perfect, white.*
      D. *Winter buds short, ovate, with several outer scales: lvs. entire or dentate only above the middle.*
        E. *Upper surface of lvs. glabrous; margin entire: flowering branchlets 2–3 in. long.* . 23. **Veitchii**
        EE. *Upper surface of lvs. more or less pubescent, margin usually dentate toward the apex.*
          F. *Infl. glabrous* ..... 24. **Wilsonii**
          FF. *Infl. pilose* ..... 25. **Henryi**
      DD. *Winter buds elongated, pointed, with 2 outer scales: lvs. doubly or incisely serrate.*
        E. *Foliage pubescent on the veins below, incisely serrate.* 26. **Rosthornii**
        EE. *Foliage glabrous, lvs. deeply serrate* ..... 27. **longigemmis**
    CC. *Fls. dixcious, pink or white: lvs. sharply serrate: winter buds ovate, with several scales.*
      D. *Shoot angular: lvs. usually ovate-oblong: fls. pink* ..... 28. **bella**
      DD. *Shoot terete: lvs. usually ovate to elliptic: fls. white* ..... 29. **expansa**
AA. *Corymbs terminal on upright shoots of the year.*

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BB. *Infl. pubescent, rarely glabrous, very compound, besides the terminal corymb lateral ones blooming somewhat later appear beneath it, only weak branches with a single corymb.*
C. *Shrub 1 ft. or less high, with bullate lvs. less than 1 in. long*.....30. **bullata**
CC. *Shrubs 1–5 ft. high, with larger lvs.*
D. *Branches terete.*
E. *Ripe follicles diverging*.....31. **japonica**
EE. *Ripe follicles upright, straight.*
F. *Fls. pink*.....32. **Margaritæ**
FF. *Fls. whitish or blushed*.....33. **Foxii**
DD. *Branches more or less angular, rather stiff, almost glabrous.*
E. *Color of fls. pink, rarely whitish*.....34. **Bumalda**
EE. *Color of fls. white*.....35. **albiflora**
BB. *Infl. consisting of only one terminal corymb, usually glabrous: follicles not diverging.*
C. *Corymbs usually pubescent.*
D. *Sepals reflexed in fr.: lvs. generally oblong, acute, or acuminate: fls. pink or whitish*.....36. **superba**
DD. *Sepals upright in fr.: lvs. generally ovate or oval: fls. white*..37. **corymbosa**
CC. *Corymbs glabrous (often puberulous in No. 41).*
D. *Stamens longer than the petals.*
E. *Fls. pink; annular disk wanting*.....38. **densiflora**
EE. *Fls. white; disk present.*
F. *Lvs. oblong, entire, or with few teeth above the middle, acute*.....39. **virginiana**
FF. *Lvs. oval or elliptic, toothed.*
G. *Margin of lvs. sharply, often doubly serrate, apex acutish*.....40. **lucida**
GG. *Margin of lvs. crenate-dentate, apex rounded*.....41. **betulifolia**
DD. *Stamens as long as petals: decumbent shrub: lvs. ½–1 in. long, sharply serrate*.....42. **decumbens**

21. **canéscens,** D. Don. Shrub, 6 or sometimes 12 ft. high, with spreading and arching branches; branchlets angled: lvs. broadly oval to obovate, very short-petioled, crenately dentate above the middle, grayish green, pubescent beneath or sometimes almost glabrous at length, ⅛–¾in. long: fls. white, rather small, in dense, semi-globose corymbs to 2 in. across, appearing very profusely along the branches; stamens about as long as petals; sepals upright or spreading in fr.: follicles villous, with the ascending styles a little below the apex. July. Himalayas. Gn. 45, p. 49; 49, p. 421; 52, p. 28; 54, p. 48; 61, p. 380; 62, p. 414. G.C. III. 43:90.—Very graceful and handsome shrub, but not hardy N. It occurs under very many different names in the gardens, as *S. cuneàta, S. cuneifòlia, S. flagellàta, S. flagellifórmis, S. rotundifòlia, S. vaccinifòlia,* and others. Var. **myrtifòlia,** Zabel (*S. argéntea,* Hort.). Lvs. dark green above, glaucescent and less pubescent below, narrower. M.D.G. 1906:385.

22. **Sargentiàna,** Rehd. Shrub, to 6 ft., with slender spreading branches; branchlets terete, puberulous at first, soon glabrous: lvs. elliptic-oblong to obovate-oblong, narrowed into the petiole, with a few acute teeth at the apex, rarely entire, puberulous above, villous beneath chiefly on the veins, ½–1 in. long: corymbs dense, 1–1¾ in. across, villous: fls. white, ¼in. across; calyx villous; stamens about as long as petals: carpels nearly glabrous. June. W. China.—A very graceful shrub, similar to *S. canescens;* has proved not quite hardy at the Arnold Arboretum.

23. **Veitchii,** Hemsl. Shrub, to 12 ft., with spreading and arching branches; branchlets puberulous while young, reddish, striped: lvs. oval to oblong, rarely obovate, obtuse, cuneate at the base, entire, finely puberulous beneath and glaucescent, glabrous above, ¾–1½ in. long: corymbs 1½–2½ in. across, puberulous: fls. ⅛in. across, white; calyx puberulous; stamens longer than petals: carpels glabrous, upright. June, July. B.M. 8383. J.H.S. 35, p. 152, fig. 98. G.M. 52:598.—Like the two following closely allied species very handsome and hardy as far north as Mass.

24. **Wilsonii,** Duthie. Shrub, to 8 ft., with arching branches; branchlets dull purplish, pubescent while young: lvs. very short-petioled, oval to oblong or obovate, obtuse or acutish, cuneate at the base, entire or with a few coarse teeth at the apex, dull green and pubescent above, grayish green and villous beneath, particularly on the veins, ¾–2¼ in. long: corymbs dense, 1½–2 in. across, glabrous or nearly so: fls. ¼in. across, pure white; calyx glabrous: follicles sparingly pilose, slightly spreading. June. Cent. and W. China. B.M. 8390. G. 35:851.

25. **Hénryi,** Hemsl. Fig. 3665. Shrub, to 8 ft., with spreading branches; branchlets sparingly pilose or nearly glabrous: lvs. obovate or oblong to oblanceolate, cuneate at the base, acute or rounded at the apex, usually coarsely dentate toward the apex, slightly hairy above, villous beneath particularly on the veins, ¾–3 in. long; petiole ⅛–¼in. long: corymb 2 in. across, rather loose, pilose: fls. ¼in. across; stamens shorter than petals: follicles hairy, slightly spreading. June. Cent. and W. China. B.M. 8270. Gn. 65, p. 44. J.H.S. 28:62, fig. 20. G. 37:35. Var. **notábilis,** Farquhar. Corymbs larger.

3665. Spiræa Henryi. (×½)

26. **Rósthornii,** Pritz. (*S. Prátlii,* Schneid.). Shrub, to 6 ft., with spreading branches; branchlets yellowish brown, sparingly hairy while young: winter buds elongated, long-pointed, often as long as petiole: lvs. ovate to ovate-oblong, acuminate, cuneate at the base, rarely nearly rounded, incisely serrate, bright green, hairy on the veins beneath, 1½–3 in. long; petioles ¼–½in. long: corymbs rather loose, 2–3 in. across, pilose, on elongated branchlets: fls. ¼in. across, white, stamens longer than petals. June. W. China.—A graceful shrub with handsome bright green foliage.

27. **longigémmis,** Maxim. Fig. 3666. Shrub, 4 ft. high, with slender terete branches, glabrous: axillary buds acuminate, longer than the petioles: lvs. ovate-lanceolate to oblong-lanceolate, incisely and doubly serrate, with glandular-tipped teeth, bright green, glabrous, 1½–2½ in. long: fls. white in rather loose 2–3-in. broad pubescent corymbs; sepals spreading in fr.: follicles almost glabrous, with terminal spreading styles June. N. W. China. G.F. 7:345 (adapted in Fig. 3666) I.T. 5:92. G. 34:443.—Hardy.

28. **bélla,** Sims (*S. expánsa,* Wall. *S. ovàta,* and *S cóccinea,* Hort.). Shrub, 3 ft. high, with slender, spreading branches, angular and sparingly pubescent: lvs. ovate-elliptic to ovate-lanceolate, acute at both ends, sharply serrate from below the middle, almost glabrous, whitish or bluish green beneath, 1–2 in. long: fls. diœcious, ⅕in. across, pink, in small corymbs, ½–2 in.

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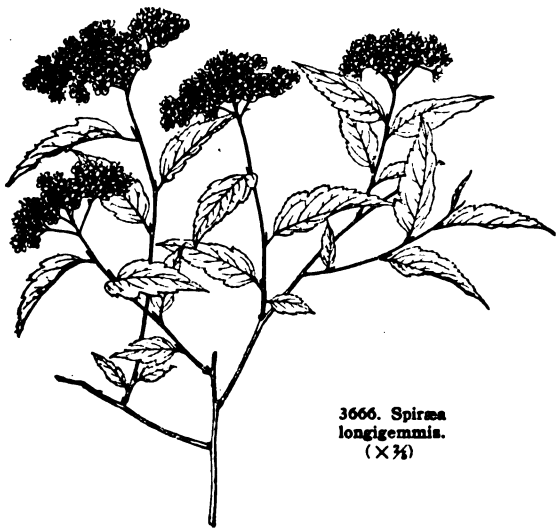
across; stamens little longer than petals; sepals reflexed in fr.: follicles pubescent only at the inner suture, with spreading styles. June, July. Himalayas. B.M. 2426. L.B.C. 13:1268.—Only half-hardy North.

29. **expánsa,** Koch (*S. bélla* var. *expánsa*, Regel. *S. fastigiàta*, Wall.). Closely allied to the foregoing; more vigorous and upright, 6 ft. high, with terete branches tomentose when young: lvs. ovate to ovate-oblong,



3666. Spiræa longigemmis. (×⅓)

acute at both ends, sharply serrate from the middle, usually pubescent on the veins beneath, 1½–3 in. long: fls. white, ¼ in. across, in 1–4-in.-broad corymbs terminal on upright, often very long branches: follicles pubescent, diverging. July. Himalayas.—**S. pulchélla,** Kunze (*S. kumaonénsis*, Hort.), is supposed to be a hybrid of this and the foregoing species; it combines the broader corymbs of the latter with the brighter color of the first species, therefore handsomer than either parent; sometimes cult. as *S. expánsa rùbra*, but there is also another hybrid of the same name. See *S. rubra* in suppl. list.

30. **bullàta,** Maxim. (*S. crispifòlia*, Hort.). Dwarf shrub, with strictly upright, brown, villous branches: lvs. roundish-ovate to ovate, very short-petioled, incisely serrate, thickish and bullate, almost glabrous, grayish green beneath, ½–¾in. long: fls. deep pink, in small and dense corymbs 1½–3 in. across. July, Aug. Japan. Gt. 35:1216.

31. **japónica,** Linn. (*S. callòsa*, Thunb.). Shrub, 4 ft. high, with upright branches glabrous or puberulous when young: lvs. ovate to oblong-lanceolate, acute at both ends or acuminate, doubly and incisely serrate, pale bluish green and usually glabrous beneath, 1–4 in. long: fls. small, pale to deep pink, in usually much-compound and rather loose corymbs; sepals reflexed in fr.: follicles glabrous, diverging with ascending styles. June, July. Japan, China.—A very variable species. The variety most common in cult. usually under the name *S. callosa* is var. **Fórtunei,** Rehd. (*S. Fórtunei*, Planch. *S. callòsa*, Lindl., not Thunb.). Higher, with quite terete branches: lvs. 2–4 in. long, oblong-lanceolate, acuminate, sharply and doubly serrate, with incurved, callous-tipped teeth, rugose above, bluish white beneath: corymbs very compound, rather loose; disk less developed, sometimes wanting. E. and Cent. China. F.S. 9:871. B.M. 5164. B.H. 8:129.—Handsome shrub with the young unfolding lvs. of a pretty purplish color and very large much-compound corymbs. The Japanese forms grow less high, have smaller and broader, coarsely doubly dentate-serrate lvs., not rugose and less whitish beneath; the sts. are slightly striped by the decurrent petioles and the infl. is less compound. Other varieties of Chinese origin are the two following recently intro. varieties. Var. **acuminàta,** Franch. Lvs. ovate-oblong to lanceolate, acuminate, green and pubescent beneath, at least on the veins, 2–3½ in. long: fls. pink, in terminal corymbs 4–6 in. across. Cent. and W. China. Var. **ovalifòlia,** Franch. Lvs. oval to elliptic, acute, glabrous and glaucescent beneath, 1½–3 in. long: fls. white, in corymbs 3–5 in. across. W. China.—Japanese forms little known in cult. are var. **pubéscens,** Regel, with the lvs. pubescent beneath and the corymbs pubescent, and var. **glabràta,** Nichols. (*S. glabràta*, Lange), with ovate glabrous lvs. and bright pink fls. in glabrous corymbs. The following are garden forms: Var. **atrosanguínea,** Zabel. Fls. deep pink, in tomentose corymbs. Var. **rubérrima,** Zabel. Fls. deep pink, in puberulous corymbs. Var. **macrophýlla,** Simon-Louis. Lvs. becoming 6 in. long, bullate: corymbs small. Var. **variegàta,** Hort. Lvs. variegated with yellowish white. Most of the other forms enumerated as varieties under this species are hybrids.

32. **Margaritæ,** Zabel (*S. japónica* × *S. supérba*). Shrub, 5 ft. high, puberulous: lvs. ovate-elliptic to elliptic, coarsely and often doubly serrate, pubescent on the midrib beneath and pale green, 2–3 in. long: fls. rather large, bright pink, in broad corymbs; sepals spreading in fr.: follicles upright, glabrous, with upright styles. July, Aug. Of garden origin.—Handsome, very free-flowering form.

33. **Fóxii,** Zabel (*S. corymbòsa* × *S. japónica*). Similar to the preceding: branches more or less striped, almost glabrous: lvs. elliptic, doubly serrate, glabrous: fls. whitish or pinkish, in large, puberulous corymbs; styles spreading in fr. June, July. R. H. 1900, p. 117. Of garden origin.—Less desirable than the preceding hybrid.

34. **Bumálda,** Burvenich (*S. japónica* × *S. albiflòra. S. pùmila*, Zabel). Shrub, 2 ft. high, rarely higher: lvs. ovate-lanceolate, sharply and doubly serrate, glabrous, 2–3 in. long: fls. whitish to deep pink: follicles diverging. July, Aug. B.H. 17: 12. Gn. 46, p. 416. Mn. 2, p. 24. G. C. III. 43:416.—Cult. in many different forms, probably all of garden origin. Two of the best are var. **Anthony Waterer,** a very free-flowering, compact shrub with bright crimson fls. in rather

3667. Spiræa albiflora. (×½)

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dense corymbs and rather narrow, incisely serrate lvs. Gn. 45:49. G.C. III. 14:365; and var. **Froëbeli,** Hort. (*S. callòsa* var. *Froëbeli*, Hort.), a taller plant with broader, ovate-oblong lvs. and also with bright crimson fls. F.E. 31:604. A similar form is **S. Lemòinei,** Zabel (*S. Bumálda* var. *rubérrima*, Hort.), hybrid of *S. Bumalda* and *S. bullata*, a low, compact shrub, with somewhat bullate lvs. and pink fls.

3668. Spiræa latifolia. (×⅓)

35. **albiflòra,** Miq. (*S. japónica álba*, Regel. *S. leucántha*, Lange). Fig. 3667. Low shrub, 1½ ft. high, with stiff, upright branches: lvs. lanceolate, coarsely or sometimes doubly serrate, glabrous, 1–2 in. long: fls. white, in dense corymbs, one large terminal and many smaller ones below along the branch; disk prominent; sepals reflexed in fr.: follicles upright, not or little diverging. July, Aug. Japan.

36. **supérba,** Zabel (*S. albiflòra* × *S. corymbòsa*). Low shrub, with striped dark brown branches: lvs. elliptic-oblong to oblong, acute at both ends, simply or doubly serrate, almost glabrous, 1–3 in. long: fls. rather large, pink or almost whitish; disk prominent; petals orbicular or broadly obovate. June, July. Of garden origin.

37. **corymbòsa,** Raf. (*S. cratægifòlia*, Link). Low shrub, with usually little-branched sts., rarely to 3 ft. high: branches purplish brown: lvs. broadly oval to ovate, acutish, coarsely and often doubly serrate, especially above the middle, pale bluish green beneath and glabrous, 1½–3 in. long: fls. white, rather small, in somewhat convex usually pubescent corymbs, 1½–3 in. across; petals oval: follicles and styles upright. May, June. N. J. to Ga. and Ky. L.B.C. 7:671. G.O.H. 82. B.B. (ed. 2) 2:246.

38. **densiflòra,** Nutt. (*S. betulifòlia* var. *ròsea*, Gray. *S. spléndens*, Baumann. *S. ròsea*, Koehne. *S. arbúscula*, Greene). Low, much-branched shrub: lvs. very short-petioled, oval to ovate, obtuse, crenately serrate, glabrous, rarely sparingly puberulous beneath, ¾–1½ in. long: fls. bright pink, in dense corymbs 1–2 in. across. June–Aug. Brit. Col. to Ore., Wyo., and Mont. G.F. 10:413.

39. **virginiàna,** Brit. Much-branched shrub, to 4 ft., glabrous: lvs. lance-oblong, acute, cuneate or rounded at the base, entire or with a few teeth above the middle, pale or glaucescent beneath, 1½–2 in. long: fls. white, in dense glabrous corymbs, about 2 in. across. June. Va. to N. C. and Tenn. B.B. (ed. 2) 2:246.

40. **lùcida,** Douglas (*S. corymbòsa* var. *lùcida*, Zabel). Closely allied to *S. corymbosa:* branches yellowish brown or brown: lvs. more incisely serrate, oval or obovate: corymb glabrous, usually looser and more flat, broader. June, July. Brit. Col. to Sask., Wyo. and Ore.

41. **betulifòlia,** Pall. Low, much-branched shrub: lvs. oval to obovate-oblong, usually cuneate at base and very short-petioled, serrate or crenately serrate, obtuse, glabrous or slightly pubescent on the veins beneath, ¾–1½ in. long: corymb usually glabrous, 1–2 in. across. June, July. Siberia to Manchuria, Kamchatka and Japan.—The three preceding species except *S. virginiana* are all closely allied and considered by some botanists varieties of *S. betulifolia.*

42. **decúmbens,** W. Koch (*S. procúmbens*, Hort.). Dwarf, procumbent shrub, about ½ft. high, with ascending branches, glabrous: lvs. elliptic to oblong, acute at both ends, crenately serrate above the middle, glabrous, ½–1 in. long: fls. white, in small corymbs, about 2 in. across: follicles glabrous, with upright terminal styles. June. Tyrol. G.C. II. 11:752. M.D.G. 1912:186. R.F.G. 24:151. G.M. 57:746.—Pretty shrub for rockeries.

SECTION III. SPIRARIA. Species Nos. 43–55.

A. *Infl. a broad panicle, about as broad as high. (Hybrids of species of this and the preceding section.)*
  B. *Panicles rather small, on lateral branchlets at the end of last year's branches* ..... 43. **Fontenayii**
  BB. *Panicles large, terminal on long, upright branches.*
    C. *Lvs. glabrous or nearly so.*
      D. *Apex of lvs. acute* ..... 44. **conspicua**
      DD. *Apex of lvs. obtuse or acutish.*
        E. *Shape of lvs. broadly ovate or obovate* ..... 45. **notha**
        EE. *Shape of lvs. oblong or oval-oblong* ..... 46. **pyramidata**
    CC. *Lvs. pubescent or tomentose beneath.*
      D. *Base of lvs. acute* ..... 47. **sanssouciana**
      DD. *Base of lvs. rounded* ..... 48. **Watsoniana**
AA. *Infl. an elongated panicle, longer than broad. (Spiraria proper.)*
  B. *Foliage glabrous or nearly so.*
    C. *Lvs. sharply serrate, except at the very base.*
      D. *Panicles tomentulose.*
        E. *Fls. light pink* ..... 49. **salicifolia**
        EE. *Fls. white* ..... 50, **alba**
      DD. *Panicles glabrous* ..... 51. **latifolia**
    CC. *Lvs. coarsely serrate above the middle: fls. pink* ..... 52. **Menziesii**
  BB. *Foliage pubescent or tomentose beneath.*
    C. *Follicles glabrous: lvs. grayish or whitish tomentose beneath.*

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DD. *Lvs. acute at both ends*.....53. **Billiardii**
DD. *Lvs. rounded or nearly so at both ends*.....54. **Douglasii**
CC. *Follicles pubescent: lvs. usually light tawny beneath*.....55. **tomentosa**

43. **Fontenàysii,** Billiard (*S. fontenaysiénsis*, Dipp. *S. canéscens* × *S. salicifòlia*). Shrub, 6 ft. high, with slender, upright branches: lvs. oval or oblong-oval, rounded at both ends, crenately serrate above the middle, pale bluish green beneath, almost glabrous, 1–2 in. long: fls. white or pink, in 1½–3-in.-long panicles; petals orbicular, about as long as stamens; sepals spreading in fr. June, July. Of garden origin.—Not quite hardy N. Var. **álba,** Zabel, is the white-fld., var. **ròsea,** Zabel, the pink-fld. form. **S. pruinòsa,** Zabel (*S. brachybòtrys*, Lange. *S. luxuriòsa*, Hort. *S. canéscens* × *S. Douglasii*), is a similar form, but the lvs. are tomentose beneath and the fls. pink.

44. **conspícua,** Zabel (*S. albiflòra* × *S. álba*). Upright shrub, 3 ft. high, with dark brown puberulous branches: lvs. elliptic-oblong, acute at both ends, simply or doubly serrate, almost glabrous, 1½–2½ in. long: fls. pinkish white, in broad finely pubescent panicles; petals shorter than stamens. July–Sept.—Handsome form. A similar hybrid is **S. syringæflòra,** Lem. (*L. albiflòra* × *S. salicifòlia*), with oblong-lanceolate or lanceolate lvs., serrate above the middle, and pink fls. Closely allied is also **S. semperflòrens,** Zabel (*S. japónica* × *S. salicifòlia*, *S. japónica* or *S. Fórtunei* var. *paniculàta*, Hort.). Higher than the former: lvs. oblong-lanceolate, usually doubly serrate: fls. pink. R.H. 1860, pp. 496, 497. Gn. 45, p. 48. G. 3:191.

45. **nòtha,** Zabel (*S. corymbòsa* × *S. latifòlia*). Shrub, 3 ft. high, with brown, glabrous branches: lvs. broadly ovate to obovate, short-petioled, coarsely and doubly serrate, almost glabrous, 1–2 in. long: fls. white to pinkish white, in broad, glabrous panicles; stamens almost twice as long as the orbicular petals. July, Aug. —Of garden origin.

46. **pyramidàta,** Greene. Possibly hybrid between *S. lucida* and *S. Menziesii*. Upright shrub, 3 ft. high: lvs. oval-oblong to oblong, acutish or obtuse, usually doubly serrate above the middle, glabrous or nearly so, 1½–3 in. long: panicles 1½–3½ in. long, rather dense, puberulous: fls. pinkish or almost white. July. Found wild in Ore. and Wash.

47. **sanssouciàna,** Koch (*S. Douglasii* × *S. japónica*. *S. Regeliàna*, Hort. *S. Nobleàna*, Hook.). Shrub, 4 ft. high, with striped, finely tomentose branches: lvs. oblong-lanceolate, sharply and usually doubly serrate, grayish tomentose beneath, 2–3½ in. long: fls. pink, in broad corymb-like panicles: follicles glabrous, with spreading styles. July, Aug. Of garden origin. B.M. 5169. I.H. 8:286.—An allied form is **S. intermèdia,** Lemoine (*S. albiflòra* × *S. Douglasii*), similar in habit to *S. syringæflora* but with the lvs. tomentose beneath.

48. **Watsoniàna,** Zabel (*S. Douglasii* var. *Nobleàna*, Wats. *S. Nobleàna*, Zabel. *S. Douglasii* × *S. densiflòra*). Shrub, 4 ft. high, similar to the former: lvs. oblong or narrowly oblong, usually rounded at the base, acute, sharply serrate above the middle, grayish-tomentose beneath, 1–3 in. long: fls. light pink, in dense broadly pyramidal, tomentulose panicles 3–6 in. high; petals half as long as stamens; sepals reflexed in fr.; styles erect. June, July. Natural hybrid, found in Calif. *S. subvillòsa*, Rydb., apparently belongs here.—A similar form is **S. pachýstachys,** Zabel (*S. corymbòsa* × *S. Douglasii*), with broader lvs. and fls. of paler pink. G.C. III. 38:322.

49. **salicifòlia,** Linn. (*S. sibírica*, **Raf.** *S. salicifòlia* var. *cárnea*, Ait.). Upright shrub, 5 ft. high, with terete yellowish brown branches puberulous when young: lvs. oblong-lanceolate to lanceolate, sharply and sometimes doubly serrate with often incurved teeth, 1½–3 in. long: fls. light pink or whitish, in oblong, dense, tomentulose panicles leafy below, the lvs. exceeding the ascending ramifications; stamens twice as long as petals; sepals upright in fr.: follicles ciliate at the inner suture. June, July. S. E. Eu. to Japan and probably Alaska. R.F.G. 24:152. G.W.H. 82. Var. **grandiflòra,** Dipp. (*S. grandiflòra*, Lodd.). Lower, with larger, lighter pink fls. L.B.C. 20:1988.

50. **álba,** Dur. (*S. salicifòlia* var. *paniculàta*, Ait. *S. lanceolàta*, Borkh.). QUEEN OF THE MEADOW. MEADOW-SWEET. Attractive upright shrub, attaining 6 ft., with reddish brown branches puberulous when young: lvs. narrow, oblong to oblanceolate, acute, usually regularly simply serrate, 1½–2½ in. long: fls. white, in leafy pyramidal tomentulose panicles, the lower spreading ramifications much longer than their supporting lvs.; stamens white, usually as long as petals: follicles quite glabrous. June–Aug. From N. Y. west to Mo., south to Ga. and Miss. B.B. (ed. 2) 2:245. —Also known as *S. salicifolia*.

3669. Spiræa Douglasii. (×⅓)

51. **latifòlia,** Borkh. (*S. salicifòlia* var. *latifòlia*, Ait. *S. carpinifòlia*, Willd. *S. canadénsis*, Hort. *S. bethlehemènsis*, Hort.). QUEEN OF THE MEADOW. MEADOW-SWEET. Fig. 3668. Branching shrub, 2–5 ft. high, with bright or dark red-brown glabrous twigs: lvs. broadly oval to obovate or oblong, usually coarsely and often doubly serrate, 1½–3 in. long: fls. white, larger than those of *S. alba*, sometimes slightly blushed and with the stamens and disk more or less pinkish; panicles quite glabrous, broadly pyramidal, with spreading and elongated ramifications; stamens longer than petals. June–Aug. Newfoundland and Canada to N. C. Em. 2:485. G.C. III. 43:417.—This and the preceding species have been referred by most American botanists to *S. salicifolia*. *S. alba* is chiefly found west, *S. latifolia* east of and on the Alleghanies, while the true *S. salicifolia* is an Old-World species.

52. **Ménziesii,** Hook. (*S. Douglasii* var. *Ménziesii*, Presl). Upright shrub, 4 ft. high, with brown, at first puberulous, branches: lvs. oblong-obovate to oblong, coarsely and unequally serrate above the middle, pale green beneath, 1½–3 in. long: fls. small, pink, in rather narrow, 5–8-in.-long panicles; stamens more than twice as long as the roundish petals; sepals reflexed in fr. June–Aug. Alaska to Ore.

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53. **Billiárdii,** Herincq (*S. Doúglasii* × *S. salicifòlia*). Shrub, 6 ft. high, with brown pubescent branches: lvs. oblong to oblong-lanceolate, acute, sharply and often doubly serrate, except in the lower third, usually grayish-tomentose beneath, at least when young, sometimes almost glabrous at length, 2–3 in. long: fls. bright pink, in 5–8-in. long, tomentose or tomentulose panicles usually rather narrow and dense. July, Aug. Of garden origin. H.F. 5:24. F.E. 18:613.—*S. Lenneàna, S. bethlehemènsis rùbra, S. triúmphans, S. exímia, S. Constántiæ, S. californica,* Hort., are very similar and probably of the same parentage.

54. **Doúglasii,** Hook. Fig. 3669. Shrub, 8 ft. high, with reddish brown, tomentose branches: lvs. oblong to narrow-oblong, rounded or acutish at both ends, unequally serrate above the middle, densely white-tomentose beneath, 1½–4 in. long: fls. deep pink, in dense, rather narrow or sometimes broad panicles, 4–8 in. long; stamens twice as long as the obovate petals; sepals reflexed in fr.: follicles glabrous. July, Aug. Brit. Col. to Calif. F.S. 2:66. R.H. 1846:101. P.M. 12:195. B.M. 5151. Gn. 23:246.

55. **tomentòsa,** Linn. HARDHACK. STEEPLEBUSH. Shrub, 4 ft. high, with upright, brown, tomentose branches: lvs. ovate to oblong-ovate, acute, unequally and often doubly serrate, densely yellowish or grayish-tomentose beneath, 1–2½ in. long: fls. deep pink or purple, in narrow dense panicles, brownish tomentose and 3–8 in. long; stamens somewhat longer than the obovate petals; sepals reflexed: follicles pubescent, usually diverging. July–Sept. Nova Scotia to Ga., west to Man. and Kans. B.B.(ed. 2) 2:245. Em. 2:485. Gn.M. 5:344. Var. **álba,** Rehd. (f. *albifòra,* Macbride). With white fls. F.E. 8:833. Gng. 5:149.—This species does not spread by suckers like most others of the section Spiraria. All the last-named species are valuable as late-blooming shrubs and decorative with their showy panicles of bright or deep pink fls. They appear at their best when planted in masses in the wilder parts of the park in low ground.

S. Àitchisonii, Hemsl.=Sorbaria Aitchisonii.—*S. amurénsis,* Maxim.=Physocarpus amurensis.—*S. ariæfòlia,* Smith=Holodiscus discolor var. ariæfolius.—*S. Aruncus,* Linn.=Aruncus sylvester.—*S. assimilis,* Zabel (S. densiflora × S. japonica). Low shrub, with pink fls. in broad corymb-like panicles. Garden hybrid.—*S. astilboides,* Moore=Astilbe astilboides.—*S. Boursièri,* Carr.=Holodiscus Boursieri.—*S. brumàlis,* Lange (probably S. expansa × S. alba). Medium-sized shrub, with oblong, incisely serrate, almost glabrous lvs. and pinkish white fls. in broad and loose corymb-like panicles. Aug.–Oct. Garden hybrid.—*S. cæspitòsa,* Nutt.=Petrophytum cæspitosum.—*S. calcícola,* W. W. Smith. Shrub to 5 ft., with slender arching branches: lvs. small, obovate or elliptic, entire, glabrous: fls. white, pink outside, in 6–8-fld. umbels. S. W. China.—*S. camtschàtica,* Pall.=Filipendula camtschatica.—*S. capitàta,* Pursh=Physocarpus capitatus.—*S. cinèrea,* Zabel (S. cana × S. hypericifolia). Medium-sized shrub, with small, oblong, usually entire, pubescent lvs. and white fls. in short-stalked umbels. Garden hybrid.—*S. concínna,* Zabel (S. albiflora × S. expansa). Medium-sized shrub, with lanceolate, sharply serrate, almost glabrous lvs. and pinkish white fls. in broad corymbs. Garden hybrid.—*S. compácta multiflòra,* Hort.=Astilbe japonica var.—*S. confèrta,* Zabel (S. cana × S. crenata). Medium-sized shrub, with small, ovate to oblong-lanceolate, 3-nerved, entire or crenate lvs. and white fls. in dense, small, peduncled umbels. Garden hybrid.—*S. dahùrica,* Maxim., is closely allied to S. alpina, but not yet intro. S. canescens and Sorbaria sorbifolia are sometimes cult. under this name.—*S. dasyántha,* Bunge. Allied to S. chinensis. Lvs. ovate, cuneate at the base, incisely serrate or lobed, with grayish white tomentum beneath: infl. grayish tomentose; stamens half as long as petals. N. China.—*S. Dàvidii,* Hort.=Astilbe Davidii.—*S. difformis,* Zabel (S. alba × S. corymbosa). Medium-sized shrub, with oval to oblong-lanceolate, serrate, almost glabrous lvs. and white fls. in large corymb-like panicles. Garden hybrid.—*S. digitàta,* Willd.=Filipendula palmata.—*S. discolor,* Pursh=Holodiscus discolor.—*S. dumòsa,* Nutt.=Holodiscus dumosus.—*S. Filipéndula,* Linn.=Filipendula hexapetala.—*S. fissa,* Lindl.=Holodiscus fissus.—*S. floribùnda.* A trade name of indiscriminate meaning. S. semperflorens and Sorbaria sorbifolia are sometimes met with under this name.—*S. gemmàta,* Zabel (S. mongolica, Hort., not Maxim.). Allied to S. alpina: axillary buds much longer than petioles: lvs. small, penninerved, oblong-lanceolate, usually entire: fls. white, in short-stalked, rather few-fld. umbels. Mongolia.—*S. Gieseleriàna,* Zabel (S. cana × S. chamædryfolia). Medium-sized shrub, with ovate, sharply serrate lvs. and rather large white fls. in long-stalked umbels. Garden hybrid.—*S. gigantèa,* Hort.=Filipendula camtschatica.—*S. grácilis,* Maxim. (S. vacciniifolia, Lodd., not Don). Low shrub, allied to S. canescens, with slender, arching branches: lvs. small, ovate, obtuse, entire or crenate above the middle, quite glabrous: fls. white, in hemispherical loose corymbs. Himalayas. L.B.C. 15:1403.—*S. grandiflòra,* Sweet=Sorbaria grandiflora.—*S. grandiflòra,* Hook.=Exochorda racemosa.—*S. Hacquétii,* Fenzl & Koch. Closely allied to S. decumbens, but grayish-pubescent and with the sepals upright or spreading in fr. N. Italy, Tyrol.—*S. Hookeri,* garden name, applied to S. nudiflora, S. bella, S. expansa, S. tristis, and others, and also to Exochorda racemosa.—*S. Húmboldtii,* Hort.=Aruncus sylvester.—*S. inflèxa,* Koch (S. crenata × S. mollis). Medium-sized shrub, with slender arching branches: lvs. elliptic-oblong, entire, sparingly pubescent beneath: fls. white, rather large, in many-fld. stalked umbels. Garden hybrid.—*S. japónica,* Hort., not Linn. f.=Astilbe japonica.—*S. kamaonènsis spicàta,* Hort., is a form of S. semperflorens.—*S. kamschática,* Auth.=Filipendula camtschatica.—*S. lævigàta,* Linn.=Sibiræa lævigata.—*S. laxiflòra,* Lindl.=S. vacciniifolia.—*S. Lindleyàna,* Wall.=Sorbaria Lindleyana.—*S. lobàta,* Gronov.=Filipendula rubra.—*S. micropétala,* Zabel (S. hypericifolia × S. media). Medium-sized shrub, with grayish green, oblong-obovate lvs., entire or serrate at the apex, 3- or penninerved: fls. white or greenish white, in umbels on leafy or naked stalks. Garden hybrid.—*S. Millefòlium,* Torr.=Chamæbatiaria Millefolium.—*S. Miyábei,* Koidzumi. Allied to S. bella and S. japonica. Lvs. ovate, incisely serrate, glabrous, 1½–2½ in. long: infl. 1½–2 in. long, puberulous: fls. white, perfect; stamens much longer than petals: follicles upright, style spreading. Japan. Var. *glabràta,* Rehd. Lvs. broadly cuneate at base: infl. glabrous. Cent. China. Var. *pilòsula,* Rehd. Lvs. pubescent on the veins beneath: infl. sparingly pilose. Cent. China. This species is very similar to S. chamædryfolia in habit and foliage and also in the individual fls. but is easily distinguished by the compound corymb. Hardy at the Arnold Arboretum.—*S. mollifòlia,* Rehd. Allied to S. alpina and S. cana. Spreading shrub, to 6 ft.: winter buds acuminate, 2-valved, longer than petioles: lvs. elliptic-oblong or oblong, entire or with few teeth at the apex, villous on both sides, ½–¾ in. long: infl. villous: fls. ½in. across, white: follicles upright, pubescent. W. China.—*S. móllis,* Koch (S. cana × S. media). Similar to S. media: lvs. smaller, usually entire, pubescent: fls. smaller, umbels pubescent. Garden origin.—*S. mongólica,* Maxim., is closely allied to S. crenata, but not yet intro.; the S. mongolica of gardens is S. gemmata.—*S. monógyna,* Torr. & Gray=Physocarpus monogynus.—*S. myrtilloides,* Rehd. Allied to S. alpina. Shrub, to 8 ft.: lvs. oval to obovate-oblong, entire, obtuse, rarely acutish, cuneate at the base, slightly pubescent beneath, ½–½in. long: infl. dense, hemispherical, on short leafy branchlets: fls. white, ¼in. across: follicles upright, glabrous. W. China. Very graceful shrub.—*S. nepalénsis,* a garden name applied to several species, as S. micropetala, S. canescens, S. salicifolia.—*S. nívea,* Zabel (S. canescens × S. expansa). Similar to S. canescens in habit, corymbs larger and looser: lvs. coarsely doubly serrate, pubescent, 1–2 in. long: fls. white or pinkish white. Garden hybrid.—*S. nudiflòra,* Zabel (S. bella × S. ulmifolia). Medium-sized shrub, with ovate, doubly serrate, almost glabrous lvs. and pinkish white fls. in hemispherical corymbs. Handsome, almost hardy shrub. Garden hybrid.—*S. opulifòlia,* Linn.=Physocarpus opulifolius.—*S. oxyodon,* Zabel (S. chamædryfolia × S. media). Similar to S. media, but branches angular: lvs. narrower, follicles with the styles terminal and spreading. Garden hybrid.—*S. Pállasii,* Don=Sorbaria grandiflora.—*S. palmàta,* Pall.=Filipendula palmata.—*S. palmàta,* Thunb.=Filipendula purpurea.—*S. palmàta,* Linn.=Filipendula rubra.—*S. parvifòlia,* Bertol.=S. gracilis.—*S. pectinàta,* Torr. & Gray=Luetkea pectinata.—*S. revirèscens,* Zabel (S. expansa × S. japonica). Medium-sized shrub, with oblong, coarsely serrate lvs., pubescent on the veins beneath: fls. light to deep pink, in large corymbs; blooming in summer and usually again in fall. Garden hybrid.—*S. ribisfòlia,* Nutt.=Physocarpus capitatus.—*S. rùbra,* Zabel (S. ruberrima, Dipp. S. Douglasii × S. expansa). Upright medium-sized shrub, with oblong-lanceolate, coarsely serrate lvs. tomentose beneath, and deep pink fls. in ovate panicles. Garden hybrid.—*S. Schinabéckii,* Zabel (S. chamædryfolia × S. trilobata). Medium-sized shrub, with arching branches: lvs. ovate to oblong-ovate, doubly serrate, glabrous: fls. white, rather large, in peduncled umbels; petals longer than stamens. Handsome shrub, similar to S. Vanhouttei. Garden hybrid.—*S. sorbifòlia,* Linn.=Sorbaria sorbifolia.—*S. Tobólskia,* Lodd.=Sorbaria sorbifolia.—*S. trifoliàta,* Linn.=Gillenia trifoliata.—*S. tristis,* Zabel. Hybrid of unknown origin, similar to S. expansa, but corymbs and the whitish pink fls. smaller; sepals upright in fr.—*S. Ulmària,* Linn.=Filipendula Ulmaria.—*S. vacciniifòlia,* D. Don (S. laxiflora, Lindl.). Shrub, to 2 ft., with arching branches: lvs. long-petioled, ovate, crenately dentate, almost glabrous, ¾–1½ in. long: fls. whitish, in tomentose corymbs, 1–3 in. across. June, July. Himalayas. F.S. 7, ℞ 190.—*S. vacciniifòlia,* Lodd.=S. gracilis.—*S. vacciniifòlia,* Hort.=S. canescens, S. brumalis.—*S. venústa,* Hort.=Filipendula rubra var. venusta.—*S. venústula,* Kunth & Bouché=S. vacciniifolia.

ALFRED REHDER.

SPIRÁNTHES (name Greek, referring to the twisted spikes). *Orchidàceæ.* LADIES' TRESSES. Terrestrial herbs, few of which have any horticultural value; some of the hardy species are advertised by dealers in native plants and by collectors.

Erect herbs with fleshy or tuberous roots: lvs. mostly at the base or on the lower part of the st.: raceme terminal, twisted; fls. spurless, small or medium-sized; sepals free or more or less united at the top, or united with the petals into a helmet; labellum sessile or clawed, concave, embracing the column and spreading into a

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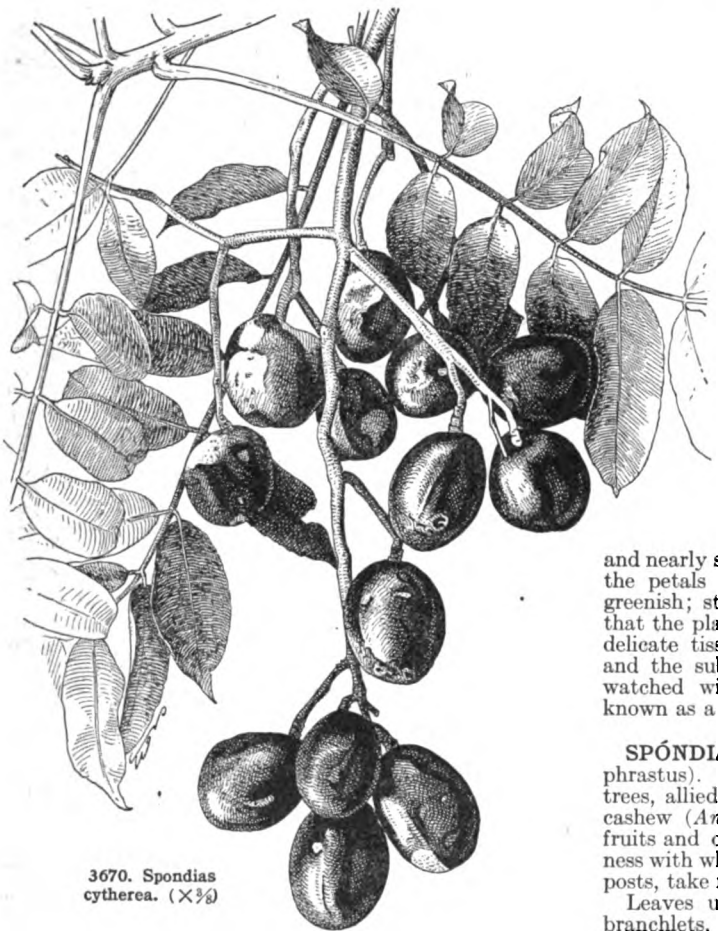
crisped, sometimes lobed or toothed blade; pollinia 2, powdery.—Some 200 species, distributed in all parts of the world except the cold regions, but particularly abundant in the tropics of S. Amer.

A. *Fls. in 3 rows: lvs. persistent at the flowering-time.*

cérnua, Rich. NODDING LADIES' TRESSES. Lvs. mostly basal, linear or linear-oblanceolate: st. 6–25 in. high, usually pubescent above, with 2–6 acuminate bracts: fls. white or yellowish, fragrant, nodding or spreading, in a spike 4–5 in. long; lateral sepals free, the upper arching and connivent with the petals; labellum oblong, rounded at the apex, crisp. Aug.–Oct. Nova Scotia to Minn. and south to Fla. B.M. 1568 (as *Neottia cernua*); 5277. B.R. 823. A.G. 13:467. V. 11:13.



3670. Spondias cytherea. (×⅜)

Romanzoffiàna, Cham. & Schlecht. Lvs. linear to linear-oblanceolate, 3–8 in. long: st. 6–15 in. high, leafy below: spike 2–4 in. long: fls. white or greenish, ringent; sepals and petals broad at base, connivent into a hood; labellum oblong, broad at the base, contracted below and dilated at the apex, crisp. July, Aug. N. Amer. G.C. II. 16:465; 26:400.

lûcida, Ames. St. 4–10 in. high, glabrous or pubescent, bearing 4–5 lanceolate or oblanceolate lvs. near the base: fls. small; sepals and petals white, lateral sepals free, narrowly lanceolate, the upper one somewhat united with the petals; labellum quadrate-oblong, yellowish above, not contracted in the middle, wavy-crisp, obtuse or truncate. June–Aug. Maine to Minn. and Va.

AA. *Fls. alternate, appearing in a single spiral row.*

B. *Lvs. present at the flowering-time.*

prǽcox, Wats. (*S. graminea* var. *Wálteri*, Gray). Lvs. linear, 4–12 in. long, grass-like: st. 10–30 in. high, glandular pubescent above, leafy: spike 2–8 in. long: fls. white or yellowish, spreading; lateral sepals free, the upper one connivent with the petal; labellum oblong, contracted above and dilated toward the apex. July, Aug. N. Y. to Fla. and La.

BB. *Lvs. mostly withered at the flowering-time.*

símplex, Gray. Root a solitary oblong tuber: lvs. basal, ovate to oblong, short, absent at the flowering-time: st. very slender, 5–9 in. high: spike about 1 in. long: fls. white; labellum obovate-oblong, eroded and crisp. Aug., Sept. Mass. to Md. A.G. 13:466.

grácilis, Beck. Roots clustered: lvs. basal, obovate to ovate-lanceolate, petioled, mostly dying before the flowering-time: st. 8–18 in. high, bearing a slender, many-fld., 1-sided or twisted spike: fls. white, fragrant; sepals longer than the labellum, the lateral ones free; labellum oblong, dilated in front, crenulate or wavy-crisp, thick and green in the middle. Aug.–Oct. E. N. Amer. A.G. 13:466.

S. colorata, N.E. Br. (Neottia speciosa, Jacq.)= Stenorrhynchus. HEINRICH HASSELBRING.

SPIRODÈLA: treated under *Lemna*.

SPIRONÈMA (name means *spiral thread*, alluding to structure of the filaments). *Commelinàceæ*. One species, *S. fragrans*, Lindl., is sometimes listed abroad for hothouse culture, an odd herb from Mex. Sometimes raised under glass for the delicious fragrance and for the transparency of its parts: st. fleshy, 2 ft. and more high: lvs. oblong-lanceolate, sheathing, parallel-veined: fls. white, clustered and nearly sessile in a terminal branched panicle, small, the petals paleaceous and diaphanous, the 3 sepals greenish; stamens 6. B.R. 26:47, where it is written that the plant will be cherished "because its thin and delicate tissue allows the hidden motion of its fluids and the subtile texture of its fructifying organs to be watched with ease and pleasure." It is very little known as a horticultural subject.

SPÓNDIAS (from a Greek word used by Theophrastus). *Anacardiàceæ*. A small genus of tropical trees, allied to the mango (*Mangifera indica*) and the cashew (*Anacardium occidentale*), cultivated for their fruits and often used for hedges because of the readiness with which large branches, when cut and used as posts, take root and grow.

Leaves usually clustered toward the ends of the branchlets, alternate, imparipinnate, with opposite lfts.: fls. polygamous, small, shortly pedicellate, disposed in racemes or panicles; calyx small, deciduous, with 4 or 5 valvate segms.; petals 4 or 5, valvate; stamens 8–10, inserted at the base of the disk; styles 3–5, free at the apex; ovary sessile, 3–5-loculed, with 1 ovule in each locule: fr. a fleshy drupe, with a 1–5-loculed woody endocarp.—Species about 12, several of which are common in the W. Indies, Mex., and elsewhere in Trop. Amer.; one species comes from the Society Isls., another from India.

cythèrea, Sonn. (*S. dúlcis*, Forst.). OTAHEITE-APPLE. POMME CYTHERE. CAJÁ MANGA. VI or EVI in Tahiti. Fig. 3670. Erect, stately tree, with rather stiff branches, up to 60 ft. in height: lvs. 8–12 in. long; lfts. 11–13, oval-oblong, 2½–3 in. long, 1–1¼ in. broad, acuminate, serrate: panicle 8–12 in. long; fls. whitish: fr. oval or obo-

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void, golden yellow, up to 3 in. long, the seed about 1½ in. long, oval, echinate. Society Isls., but widely spread in the tropics.

Mómbin, Linn. (*S. purpùrea*, Linn.). Spanish Plum. Prunier d'Espagne. Ciruela. Small tree, sometimes spreading, stiff, up to about 25 ft. in height: lvs. 5–8 in. long; lfts. 16–21, oblong-elliptic, 1–1½ in. long, ⅝in. broad, usually somewhat asymmetrical, acute or bluntish, subserrate: racemes unbranched, about ½in. long, few-fld.; the fls. purplish maroon: fr. oblong-obovoid, commonly purplish, about 1 in. long, the seed oblong-elliptical, ½–¾in. long, roughened on the surface. Trop. Amer.

lûtea, Linn. (*S. Mómbin*, Jacq., not Linn.). Hog-Plum. Mombin. Jobo. Cajá. Tall, handsome tree, up to about 60 ft. in height: lvs. 8–12 in. long; lfts. 7–17, ovate-lanceolate or lanceolate, 2½–4 in. long, 1–1½ in. broad, subentire or serrulate: panicle ½–1 ft. long, the fls. yellowish white: fr. ovoid, yellow, 1–1½ in. long, the seed oblong, ¾–1 in. long, smoothish. Cosmopolitan in the tropics.

pinnâta, Kurz (*S. mangífera*, Willd.). Hog-Plum. Amra. Small tree: lvs. 12–16 in. long; lfts. 5–11, ovate-oblong or elliptic-oblong, 4–6 in. long, 1½–3 in. broad, acuminate, entire: panicle 10–14 in. long; fls. whitish: fr. ovoid, yellow-green, 1½–2½ in. long, the seed oblong-elliptical, 1½–2 in. long, smoothish. Trop. Asia; according to Hooker, ascending to 5,000 ft. in the Himalayas.

tuberòsa, Arruda. Imbú. Umbú. Low, spreading tree, up to 25 ft. in height, with swollen roots: lvs. 4–6 in. long; lfts. 5–9, oblong-ovate, 1–1¾ in. long, ⅝–1 in. broad, sharply acute to acuminate, cordate at base, entire: panicle 4–6 in. long; fls. whitish: fr. ovoid, light yellow, 1½ in. long, the seed oblong-ovate, slightly flattened, ½–¾in. long, smooth. Brazil.

Cultivation and uses.

The Otaheite-apple, *S. cytherea*, is said to have been introduced to Jamaica in 1782, and again in 1792 by the famous Captain Bligh, who brought the bread-fruit from Tahiti to the West Indies. It has not become popular in Cuba, nor is it very extensively grown on the mainland of tropical America. In south Florida it succeeds well, and fine specimens can be seen at Miami and other points. In California it has not yet fruited, so far as known, and seems to be too tender for successful culture in any but the most favored locations. Some of the early travelers who visited Polynesia spoke of it in very high terms, and more recently it has been recommended as worthy of culture by numerous writers. Firminger, however, likens it to a "very bad mango." Probably a great deal depends on the variety. At its best the fruit is the size of a lemon; it is of deep golden yellow color when ripe, aromatic, with a thin but tough skin surrounding the soft, juicy, yellow pulp. The seed is large and oval, furnished with long woody spines over its entire surface. The flavor is sprightly, subacid, aromatic, suggesting the pineapple, but sometimes resinous and disagreeable. It is eaten out of hand, and also used to prepare jams and preserves.

The Spanish plum, *S. Mombin*, is much more common in tropical America, and occurs in a large number of varieties, some of which are of excellent flavor and quality, others rather inferior. In Cuba, where this fruit is called ciruela, the different varieties are distinguished by the addition of such words as roja (red), amarilla (yellow), and the like. In Brazil the species seems to be little known, but in Mexico and Central America it is widely grown. It is successfully cultivated in south Florida, but so far as known has never fruited in California, though it may be possible to grow it successfully in favored locations. The tree, which is much smaller than the Otaheite-apple, is deciduous during a portion of the year, as are the other species. The fruit is oval, about an inch long, usually purplish red in color, with a bright yellow, very juicy pulp of aromatic, subacid flavor. It is used like the Otaheite-apple.

The hog-plum, *S. lutea*, is one of the least esteemed of the genus. Its fruits are slightly larger than those of *S. Mombin*, but of a rank, pungent flavor which is not especially agreeable. Jumelle says that it makes an excellent refreshing drink. The tree is large and handsome, and is a conspicuous feature of many Cuban landscapes. *S. pinnata*, the hog-plum or amra of India, is scarcely known in America. Indian writers, who do not usually speak highly of it, state that it is used for pickles, preserves, and tarts. Firminger advises using it as a stock for *S. cytherea*.

The imbu of Brazil, *S. tuberosa*, is a little-known species introduced to the United States in 1914 by the Bureau of Plant Industry. Previous to this time it seems to have been unknown outside of its native home, but on the dry lands of interior northeastern Brazil (states of Bahia, Pernambuco, and so on) it is exceedingly abundant and the fruits are highly esteemed by the natives. Its tuberous roots are an adaptation to arid regions. The fruits are the size of large plums, with a pale yellow skin, soft, juicy pulp and a large, nearly smooth seed. The flavor slightly resembles that of a sweet orange, and is very agreeable. An excellent jelly is made from this species, and also a sweet custard called imbuzada, prepared by mixing the strained and sweetened pulp with boiled milk. For eating out of hand it is probably superior to the other species, with the exception of the best varieties of the Spanish plum.

This genus is of very simple culture. All the species are easily propagated by cuttings of large wood, which may be set in permanent locations immediately upon removal from the parent tree. Seeds can easily be grown in flats of light soil, covering them to the depth of an inch. They usually germinate within four to six weeks. Most of the species seem adapted to a variety of soils. They can readily be inarched, but this is not often practised in this country because of the ease with which cuttings can be grown. Improvement of all the species should be carried on by means of selection. F. W. Popenoe.

SPORE, a reproductive detached cell of a cryptogamous or so-called flowerless plant, not containing an embryo as does a seed. Spores are the reproductive bodies of ferns, mosses, club-mosses, liverworts, fungi, and similar plants. They are of interest to the plant-grower mostly as the means of propagating ferns. For description, see *Ferns* and *Fungi;* also the articles on *Mildew, Rust,* and *Smut,* in Vols. III, V, VI. For propagation by spores, see the discussion under *Ferns,* page 1211, Vol. III.

SPORÓBOLUS (Greek, *spora*, seed, and *ballein*, to cast forth, referring to the grain readily falling from the spikelet). *Gramíneæ.* Dropseed. Spikelets 1-fld., awnless, usually small, in narrow or open panicles.—About 80 species, chiefly of Temp. and Trop. Amer., of little value. *S. cryptándrus*, Gray, a widely distributed annual, is considered a good forage grass; *S. Wrightiànus*, Munro, Sacaton, of the alkali lands of the S. W. and of Mex., and *S. airoìdes*, Torr., an allied species, furnish pasture in alkali flats. *S. minutiflòrus*, Link, a slender annual with minute spikelets in a delicate panicle, is offered as an ornamental by some seedsmen under the name of *Agrostis minutiflora*. The species are little known horticulturally. A. S. Hitchcock.

SPRÀGUEA (named for Isaac Sprague, of Cambridge, Mass., botanical artist, collaborator of Asa Gray). *Portulacàceæ.* Dwarf half-hardy perennial herbs, well adapted to the rockery: lvs. radical, spatulate, somewhat fleshy; the cauline minute, alternate:

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stipules small and scarious: fls. ephemeral, in dense, scorpioid spikes, umbellately clustered on scape-like peduncles; sepals 2, orbiculate-cordate, membranaceous-hyaline, persistent; petals 4; stamens 3; ovary free: caps. membranaceous, rounded-compressed, 2-valved; seeds 8–10, black and shiny.—One, possibly 2 species, W. N. Amer.

umbellàta, Torr. Sts. several, simple, erect, 2–12 in. high: radical lvs. spatulate or oblanceolate; the cauline similar but smaller: fls. white, tinged rose, in a dense capitate umbel of nearly sessile spikes; sepals conspicuous; petals oblong-ovate. Late summer. Sierra Nevada, at 3,000–10,000 ft. altitude, from the Yosemite valley to the British boundary, usually in sandy dry soils. B.M. 5143. May be treated as an annual. Var. **caudicífera,** Gray, is a subalpine form in which the caudex-like branches extend for a year or more (the lvs. below dying away) and are at length terminated by scapes an inch or so in length. Desirable for rockwork and edgings. F. TRACY HUBBARD.†

SPRAYING: *Diseases and Insects,* page 1057, Vol. II.

SPREKÈLIA (J. H. von Sprekelsen, of Hamburg, who sent the plants to Linnæus). *Amaryllidàceæ.* JACOBÆAN LILY. Half-hardy bulbous plants, generally grown in the greenhouse, often known as amaryllis: lvs. appearing late, strap-shaped-linear: scape hollow, cylindrical, 1-fld.: fl. large, showy; perianth gaping, tube none, upper segm. broadest, 2 lateral lanceolate, 3 lowest deflexed, rolled together inclosing the stamens and style; ovary turbinate, 6-angled, 3-celled: caps. globose-trigonous, 3-valved.—One species, Mex. For cult., see *Amaryllis;* also consult Hippeastrum, with which these plants are sometimes confused.

formosíssima, Herb. (*Amarýllis formosíssima,* Linn.). Bulb globose, 2 in. diam.; tunics brown: lvs. 3–6, contemporary with the fls., linear, green, finally 1–1½ ft. long: peduncle reddish, 6–12 in. long; spathe red-brown, 2 in. long, bifid at the tip; pedicel erect: perianth bright crimson, 3½–4 in. long. April. B.M. 47. G.L. 27:140. G.W. 15, p. 358. Var. **glaùca,** Baker (*S. glaùca,* Lindl.), has glaucous lvs.: fls. smaller and paler than the type. B.R. 27:16. F. TRACY HUBBARD.†

SPRING BEAUTY: *Claytonia.*

SPRING-GARDENING. The gardening instinct is at its height in spring. The turn of the season invites it, and the wealth of quick-growing plant-material is great. On the plant-growing side, nothing need be said here that is not already written in other articles in this work, but names of a few plants for spring effects may be suggested.

The spring-gardener will think first of bulbs—crocuses, hyacinths, tulips, squills, snowdrops, fritillies, and others. These are described under their regular alphabetic generic entries, and also under the article *Bulbs* in Vol. I.

If one does not have a greenhouse, many of the annual flowers may be used for early spring bloom if the seeds are started in the window, or, as with pansies, if plants are established in autumn and carried over winter under a protection of leaves or other mulch. Some of the early-blooming hardy annuals are alyssum, candytuft, collinsia, daisy (*Bellis perennis,* perennial but may be treated as an annual after the manner of pansies), pansy, schizopetalon, stocks, violet, Virginian stock, wallflower (annual), pinks as annuals.

The spring-garden will derive its chief satisfaction, however, from the early-blooming perennial herbs, of which there are great numbers of attractive species. A few of the best kinds are here named: *Adonis vernalis,* anemonis, arabis, aubrietia, auricula, clintonia, cowslip (Primula), dicentra, forget-me-not, helleborous or Christmas rose (earliest, except perhaps some of the bulbs), iris, oxalis, *Papaver nudicaule,* pinks, polyanthus and other kinds of primula, pyrethrum, wallflower (perennial), and very many native perennials as epigæa, trillium, erythronium, hepatica, isopyrum, anemone, claytonia, phlox, sanguinaria, caltha.

The wealth of early-blooming trees and shrubs must not be overlooked, nor the beauty of sturdy herbaceous growths pushing from the ground.

A good part of one's success in spring-gardening results from careful preparation the previous autumn, particularly in providing good winter protection for young or partially tender plants that are to be carried over. All should be made ready before winter closes in, so that the first advantage may be taken of the opening of spring. L. H. B.

SPRUCE: *Picea.* **Douglas S.:** *Pseudotsuga taxifolia.* **Norway S:** *P. excelsa.* **Sitka S.:** *P. sitchensis.* **Tideland S.:** *P. sitchensis.*

SPURGE: *Euphorbia.* **S., Mountain:** *Pachysandra procumbens.* **S. Nettle:** *Jatropha.*

SPURRY (*Spergula sativa,* which see) has long been grown in Germany, France, Holland, and Belgium, where its value as a soil-renovator and as a forage crop was early recognized. It is an annual, and when sown in the spring matures seed in ten to twelve weeks from time of sowing. This plant possesses special value as a renovator for sandy soils. It has long been used by the farmers of Holland to hold in place the shifting sands along the seashore. So well adapted is it to sand that it has been termed "the clover of sandy lands." It is not recommended for the American farmer except where the soil is so poor that other plants fail. In such circumstances it may be used as a cover-crop to plow under. The seed may be sown any time from April to August, but in orchards it would better be sown in July. Sow at the rate of six quarts to the acre. The seed being small, it should be lightly harrowed in upon a well-fitted soil. It is very persistent in the production of seed, and upon fertile soils it will maintain itself for several years unless thorough cultivation is given. Where soils are in fair condition and other crops will grow, it is doubtful whether spurry has any place. Sometimes written spurrey. L. A. CLINTON.

SQUASH: See the article *Pumpkin and Squash,* page 2859, Vol. V.

SQUAW-BERRY: *Mitchella repens.*

SQUILL: For the garden squill, see *Scilla;* for the medicinal squill, see *Urginea.*

SQUIRREL-CORN: *Dicentra canadensis.*

STÀCHYS (from an old Greek name applied by Dioscorides to another group of plants, coming from the word for *spike*). *Labiàtæ.* WOUNDWORT. Tall perennial herbs or diffuse annuals, rarely subshrubs or small shrubs, both greenhouse and hardy plants, little known to gardeners.

Leaves very entire or dentate, the floral lvs. similar or reduced to bracts: floral whorls 2- to many-fld., axillary or arranged in terminal spikes: fls. sessile or very short-pedicelled, purplish, scarlet, pale yellow, or white, small or sometimes showy; calyx tubular-campanulate, 5–10-nerved, 5-toothed; corolla-tube cylindrical, included or exserted, limb 2-lipped, the posterior often villous outside; stamens 4: nutlets ovoid or oblong.—About 270 species, mainly in the temperate regions but a few in the tropical and colder regions, scattered all over the world. The arrangement followed in the sections and sequence of species is that of Briquet in Engler & Prantl, Pflanzenfamilien, IV. 3*a*:260. Very few of the species are cult., although there are several with showy spikes. They are usually found in moist or even wet places when growing wild. A tuber-bearing species (*S. Sieboldii*) has come into notice as a kitchen-garden plant.

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KEY TO SECTIONS.

A. *Outer bracts developed, reaching at least half-way up the calyx, often equaling or even exceeding it.*
B. *Annulus or ring at base of corolla absent; corolla-tube mostly exserted; anther-cells parallel.* Section I. BETONICA. Species 1–5.
BB. *Annulus or ring at base of corolla oblique and hairy; corolla-tube usually inclosed; anther-cells divergent or divaricate.* Section II. ERIOSTOMUM. Species 6–10.
AA. *Outer bracts minute, very much shorter than the calyx.* Section III. EUSTACHYS. Species 11–17.

Section I. BETONICA.

A. *Lowest floral-lvs. cordate-ovate.*
B. *Corolla more than 1 in. long*..... 3. **grandiflora**
BB. *Corolla scarcely ½in. long*..... 1. **densiflora**
AA. *Lowest floral lvs. lanceolate.*
B. *Lvs. white beneath*..... 5. **discolor**
BB. *Lvs. green or pale beneath.*
C. *Calyx ½in. or more long*..... 4. **longifolia**
CC. *Calyx scarcely ¼in. long*..... 2. **officinalis**

1. **densiflòra,** Benth. (*Betónica incàna,* Ait.). Perennial, 1½ ft. high: sts. erect, hirsute: lvs. 2–3 in. long, petioled, ovate-oblong, obtuse, crenate, base cordate, soft-pilose or more or less villous; floral lvs., lowest cordate-ovate, short-petioled: floral whorls approximate in a dense spike, lower whorls remote: calyx campanulate; corolla villous outside, flesh-colored. S. Eu. B.M. 2125.—There are older names referred to this species, but it is not certain that they are truly synonyms; even *Betonica incana* may not belong here.

2. **officinàlis,** Franch. (*S. Betónica,* Benth. *Betónica officinàlis,* Linn.). BETONY. Fig. 3671. A hardy perennial herb 1–3 ft. high: lower lvs. long-petioled, ovate-oblong, crenate, obtuse, cordate at the base, 3–6 in. long; upper lvs. distant, sessile, oblong-lanceolate, acute: fls. purple, in a dense, terminal spike. July. Eu., Asia Minor. —Rarely found as an escape in this country, and once cult. for use in domestic medicine. Useful for ornament, and now advertised for that purpose. There are white-fld. forms of the species offered in the trade under the names of *S. Betónica álba* and *S. Betónica albiflòra* and there is also a large-fld. form with soft rose-colored fls. known as *S. Betónica grandiflòra.*

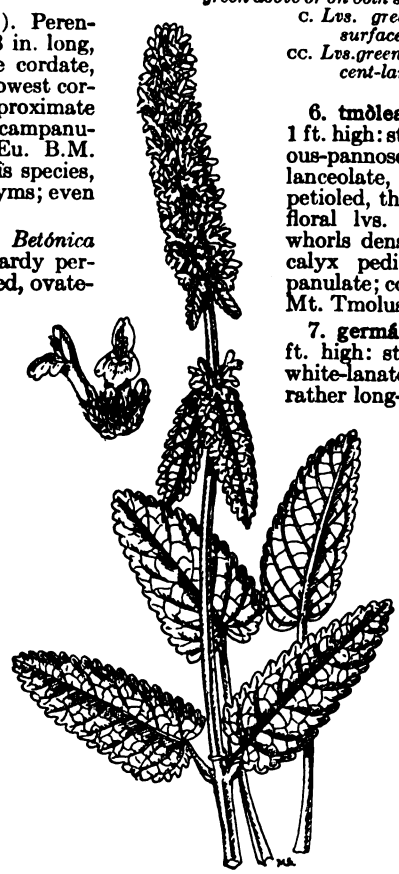
3. **grandiflòra,** Benth. (*Betónica ròsea,* Hort. *B. spicàta,* Hort. *B. grandiflòra,* Willd.). A hardy perennial about 1 ft. high: lower lvs. broadly ovate, obtuse-crenate, long-petioled, base broadly heart-shaped; the upper gradually smaller, nearly similar and sessile, the uppermost bract-like: fls. violet, large and showy, the curving tube about 1 in. long and 3 or 4 times surpassing the calyx, in 2–3 distinct whorls of 10–20 fls. each. Asia Minor, etc. B.M. 700. G.M. 53:628. Var. **robústa,** Hort. (*Betónica grandiflòra robùsta,* Hort. *B. spicàta robústa,* Hort.), is said to have tufts of corrugated lvs., to grow 18 in. high and spikes 3 in. long of rosy pink fls. Gn.W. 25: 299. Var. **supérba,** Hort. (*Betónica grandiflòra supérba,* Hort. *B. supérba,* Hort.), is said to have showy spikes of intense mauve or a rich shade of purple-violet fls. There is a white variant of this known in the trade as *Betónica supérba álba.*

4. **longifòlia,** Benth. (*Betónica orientàlis,* Linn.). A hardy perennial herb about 1 ft. high, densely villous: lower lvs. petioled, oblong-lanceolate, obtuse, crenate, deeply cordate at the base, 4–6 in. long; the upper lvs. similar in shape but sessile, those of the infl. bract-like: fls. reddish purple to pink, in a cylindrical, somewhat interrupted spike about ½ft. long. July. Caucasus.—Briquet in Engler & Prantl's Pflanzenfamilien has adopted *macrostachys* as the specific name, basing his name on *Betónica macróstachys,* Wender, but authorities differ as to the identity of Wender's material, hence the Bentham name has been retained.

5. **díscolor,** Benth. (*S. nívea,* Benth., not Labill. *Betónica nívea,* Stev.). Perennial, about 1 ft. high, villous: lvs. petiolate, oblong-lanceolate, obtuse, deeply crenate, rugose above, white-lanate beneath; floral lvs., upper lanceolate: floral whorls many-fld., somewhat distinct, few: calyx lanuginose-villous; corolla large, villous, rose, rarely yellowish white. Caucasus.

Section II. ERIOSTOMUM.

A. *Corolla yellow*..... 6. **tmolea**
AA. *Corolla purple or pink.*
B. *Sts. and lvs. densely white-lanate.*
C. *Base of lf. cordate*..... 7. **germanica**
CC. *Base of lf. narrowed or sometimes rounded-cordate*..... 8. **lanata**
BB. *Sts. laxly soft-pilose-villous: lvs. green above or on both surfaces.*
C. *Lvs. green on both surfaces*..... 9. **alpina**
CC. *Lvs. green above, canescent-lanate beneath*. 10. **sericea**



3671. Stachys officinalis. (×⅓)

6. **tmòlea,** Boiss. Perennial, about 1 ft. high: sts. ascending, densely sericeous-pannose: lvs. lanceolate or oblong-lanceolate, obtuse, obscurely dentate, petioled, the radical about 3 in. long; floral lvs. oblong, acuminate: floral whorls densely many-fld., far remote: calyx pedicellate, hirsute, long-campanulate; corolla yellow, tube included. Mt. Tmolus region, Asia Minor.

7. **germánica,** Linn. Perennial, 1–4 ft. high: sts. herbaceous, tall, loosely white-lanate: radical lvs. 2–5 in. long, rather long-petioled; cauline lvs. short-petioled, ovate or ovate-lanceolate, obtuse, base usually cordate, crenate; lower floral lvs. subsessile, somewhat clasping, crenate, white-lanate: floral whorls many-fld., distinct, racemose, upper approximate: calyx lanate inside; corolla pale pink, variegated with white, lanate outside, tube included. Eu., Cent. Asia and N. Afr. B.R. 1289. Var. **Boissièri,** Briq. (*S. crètica,* Sibth. & Smith, not Linn.), has oblong or linear-lanceolate lower lvs., oblong-triangular or short-lanceolate floral lvs. and a rose-colored corolla, the upper lip of which is lanate. S. E. Eu., Asia Minor, and Syria.

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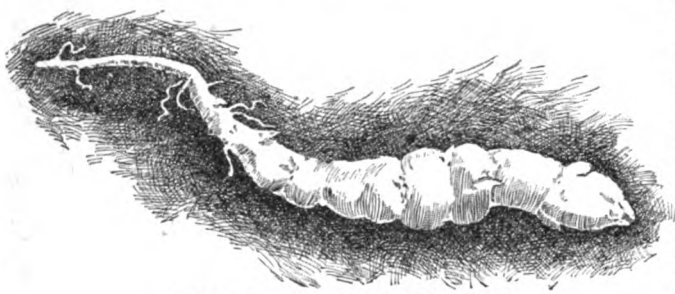
8. **lanàta,** Jacq. WOOLLY WOUNDWORT. A hardy perennial 1–1½ ft. high, white-woolly throughout: lvs. oblong-elliptical, the upper smaller, the uppermost much shorter and whorled: fls. small, purple, in dense 30- or more-fld. whorls in interrupted spikes. Caucasus to Persia. Gn. 78, p. 543.—Often grown as a bedding plant. Valuable for its very white herbage.



3672. Tuber of Stachys Sieboldii. (×¾)

9. **alpìna,** Linn. Herbaceous, tall: sts. erect, pilosely somewhat lanate: lvs. petioled, ovate, serrate-crenate, base cordate, both surfaces green or slightly canescent beneath; floral lvs. narrower, gradually smaller: floral whorls all remote, 15–20-fld.: calyx rather pilose, teeth lanceolate-ovate, strongly spined; corolla obscurely purplish or red-brownish, about twice as long as the calyx. Eu.

10. **sericea,** Wall. Herbaceous, tall: st. erect, very pilose: lvs. petioled, ovate or ovate-oblong, rather obtuse, crenate, base cordate, both surfaces villous, green above, pale or hoary beneath, the younger lvs. sericeous-lanate: floral whorls all distant, 10–15-fld.: calyx lanate, teeth ovate-lanceolate, very acute, spined; corolla pink, spotted with purple, hairy, scarcely longer than the calyx. Himalaya region and N. Asia.—There is an older *S. sericea* (of Cavanilles), but its botanical status is unknown. It is a native of Chile.

Section III. EUSTACHYS.

A. *Species annual*.....17. **corsica**
AA. *Species perennial.*
B. *Corolla-tube long-exserted*.....11. **coccinea**
BB. *Corolla-tube included in the calyx or slightly exserted.*
C. *Plant with a basal rosette, below which the flowering shoots arise*...16. **citrina**
CC. *Plant without a basal rosette.*
D. *Angles of sts. not retrorse-hairy or prickly: annulus inside corolla, oblique, incomplete or even none*.....15. **recta**
DD. *Angles of sts. retrorse-hairy or prickly, rarely glabrous: annulus inside corolla, pilose, complete.*
E. *Tubers lacking*.....13. **aspera**
EE. *Tubers present.*
F. *Lvs. ovate, deltoid-ovate or ovate-lanceolate: tubers slender, clavate, nodose*...12. **Sieboldii**
FF. *Lvs. cordate-oblong-lanceolate, very obtuse: tubers cylindrical, uniformly nodose*.....14. **floridana**

Subsection CALOSTACHYDES.

11. **coccínea,** Jacq. One to 2 ft., slender, soft-pubescent: lvs. ovate-lanceolate, cordate at base or somewhat deltoid, obtuse, crenate: fls. scarlet-red, the narrow tube much exceeding the calyx, pedicelled, in an interrupted spike, blooming in succession. W. Texas to Ariz. B.M. 666. P.M. 8:101.—Showy.

Subsection GENUINÆ.

12. **Sièboldii,** Miq. (*S. affìnis,* Bunge, not Fresenius. *S. tuberífera,* Naudin). CHOROGI. CHINESE OR JAPANESE ARTICHOKE. KNOTROOT. CROSNES DU JAPAN. Fig. 3672. Erect hairy mint-like plant, growing 10–18 in. tall: lvs. ovate to deltoid-ovate to ovate-lanceolate, cordate at base, obtuse-dentate, stalked: fls. small, whitish or light red, in a small spike: tubers (Fig. 3672) 2–3 in. long, slender, nodose, white, produced in great numbers just under the surface of the ground. China, Japan. G.C. III. 3:13.—Sent to France in 1882 from Pekin by Dr. Bretschneider, and about ten years ago intro. into this country. It is cult. for the crisp tubers, which may be eaten either raw or cooked. These tubers soon shrivel and lose their value if exposed to the air. The tubers withstand the winter in Cent. N. Y. without protection, so that a well-established plant takes care of itself and spreads. For history, chemical analyses, etc., see Cornell Bull. No. 37.

13. **áspera,** Michx.. Erect, usually strict, 3–4 ft. high, the st. retrorsely hairy on the angles: lvs. oblong-ovate to oblong-lanceolate, mostly acuminate, serrate, petiolate: corolla small, glabrous, pale red or purple, in an interrupted spike. Wet places, Ont. and Minn. to the Gulf. L.B.C. 15:1412.—Has been offered by dealers in native plants.

14. **floridàna,** Shuttlew. Slender, erect, 1–2 ft., branching, glabrous: lvs. cordate-oblong-lanceolate, blunt-toothed, stalked: fls. small, light red, in an open interrupted spike: tubers cylindrical, uniformly nodose, 4–6 in. long. Fla.—Has been tested abroad as a food plant, and also at the Cornell Exp. Sta. (see Bull. No. 61), but practically unknown horticulturally. The tubers are as good for eating as those of *S. Sieboldii.*

Subsection RECTÆ.

15. **récta,** Linn. (*S. sylvéstris,* Forsk.). Perennial: st. erect or ascending, about 2 ft. high, pilose: lvs. short-petioled, oblong-ovate or lanceolate, obtuse, crenate, 1–1½ in. long, base rounded or narrowed, rugose, hairy; floral lvs. sessile: floral whorls about 10-fld., distant: calyx ovate-campanulate, hairy, teeth ovate, subspinose; corolla yellowish white, throat purplish, glabrous, twice as long as the calyx. S. Eu., Caucasus. Var. **leucoglóssa,** Boiss. (*S. leucoglóssa,* Griseb.). Lvs. narrowly lanceolate, lower serrate, upper entire and linear: calyx somewhat scabrous, teeth as long as the tube. Caucasus.

Subsection INFRAROSULARES.

16. **citrìna,** Boiss. & Heldr. Subshrub, gray-canescent pannose: lvs. 1–1½ in. long, all basal, long-petioled, elliptical, obtuse, base attenuate, entire or minute, crenulate; floral lvs. narrower: fls. in small terminal heads which are short-ovate, dense, the lower floral whorls often subdistant and interrupted; calyx hirsute, campanulate; corolla sulfur-yellow, hirsute outside, included in the calyx. Greece, E.

3673. Stachys corsica. (×¾)

Subsection OLISIÆ.

17. **córsica,** Pers. Fig. 3673. Slender procumbent pilose herb: lvs. about ½in. long, petioled, ovate, very obtuse, broadly crenate, base rounded or subcordate; floral lvs. smaller: floral whorls 2–4-fld., remote: calyx campanulate, hispid, teeth lanceolate, acute, subspiny; corolla pinkish white, twice as long as the calyx, the tube short-exserted. Medit. region.

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Betónica cárnea, Hort., is offered in the trade, probably a flesh-colored form of S. grandiflora.—*Betónica rúbra*, Hort., is also in the trade, probably a red-fld. form of S. grandiflora.

F. TRACY HUBBARD.†

STACHYTARPHÈTA (Greek, *dense spike*). *Verbenàceæ*. Simple pilose, villous or glabrous herbs or shrubs, suitable for the warmhouse but hardy outside in the extreme southern United States.

Leaves opposite or alternate, dentate, often rugose: spikes terminal, sometimes long and dense, sometimes short or lax: fls. white, blue, purple, or scarlet, solitary in the axils of the bracts, sessile or half sunk in the rachis of the spike; calyx narrow-tubular, 4–5-ribbed, 4–5-toothed; corolla-tube cylindrical, limb spreading, 5-cleft, lobes broad, obtuse or retuse; perfect stamens 2; ovary 2-celled: fr. included in the calyx, oblong-linear. —About 50 species, mostly natives of Trop. and Subtrop. Amer. but one (*S. indica*) is dispersed very broadly in the tropics of Afr. and Asia.

mutábilis, Vahl. A low shrub, scabrous-pubescent: lvs. ovate, dentate, scabrous above, whitish-pubescent beneath: spike long, erect: bracts lanceolate, subulate: calyx 4-dentate, hispid, 4–6 lines long; corolla crimson, fading to rose, ½–¾in. across. W. Indies, Mex. to Guiana. B.M. 976. Gt. 3, p. 178.—Cult. in S. Calif.

índica, Vahl (*S. jamaicénsis*, Vahl. *S. urticifòlia*, Dalz. & Gibs.). Herb, 1–2 ft. high: branches quadrangular: lvs. 1–4 in. long, elliptic, serrate: spikes 3–12 in. long: fls. finally sunk in the thickened rachis, deep blue; calyx 4-toothed, 4-nerved. Trop. Amer.; Asia, probably naturalized. B.M. 1860.

F. TRACY HUBBARD.†

STACHYÙRUS (Greek, *spike* and *tail;* in allusion to the form of the inflorescence). *Stachyuràceæ*, formerly usually included in *Ternstrœmiàceæ*. Ornamental woody plants grown for their very early flowers and the handsome foliage.

3674. Stachyurus præcox. (×⅓)

Deciduous or evergreen shrubs or trees: lvs. alternate, slender-petioled, serrate, with small deciduous stipules: fls. perfect or polygamous, nearly sessile, in pendulous axillary racemes; sepals 4, strongly imbricate; petals 4, imbricate; stamens 8 with slender filaments; ovary superior, incompletely 4-celled; style simple, with 4-lobed stigma: fr. a 4-celled, many-seeded small berry.—Five or possibly 6 species in Japan, China, and the Himalayas.

The species in cultivation are handsome shrubs with spreading branches, with medium-sized bright green, generally ovate to ovate-oblong leaves and pale greenish yellow flowers in long pendulous spikes appearing early in spring before the leaves from the axils along last year's branches. They have proved hardy in sheltered positions as far north as Massachusetts, but the flower-buds which are formed in autumn and remain naked during the winter are killed by the frost, if not protected. They grow well in moderately moist well-drained soil. Propagation is by seeds or usually by softwood cuttings under glass and by layers.

præcox, Sieb. & Zucc. Fig. 3674. Shrub, to 12 ft.: young branchlets reddish brown or chestnut-brown and lustrous: lvs. elliptic-ovate to ovate-lanceolate, acuminate, rounded at the base, serrate with somewhat spreading teeth, glabrous and lustrous beneath or slightly pubescent on the veins, 3–6 in. long: racemes 2–3 in. long: fls. campanulate, ⅓in. long; style shorter than petals: fr. globose, ⅓in. across, greenish yellow with reddish cheek. March; fr. in Sept., Oct. Japan. B.M. 6631. G.C. III. 21:285 (adapted in Fig. 3674). Gn. 75, p. 204. R.H. 1908, p. 87. S.I.F. 1:74.

chinénsis, Franch. Shrub, to 15 ft., very similar to the preceding species: young branchlets greenish or dull brown: lvs. ovate to oblong-ovate, long-acuminate, rounded or subcordate at the base, crenately serrate, glabrous, 2½–5 in. long: racemes 2–3½ in. long: fls. spreading, about ⅓in. long; style as long as petals or slightly exserted: fr. globose, ¼in. across. March. Cent. China. Gn. 79, p. 182.

ALFRED REHDER.

STACKHOÙSIA (named for John Stackhouse, an English botanist). *Stackhousiàceæ*. Small herbs from a perennial herbaceous or woody rhizome, used for ornamental planting in warm climates: lvs. alternate, linear or spatulate, entire, leathery or somewhat fleshy; stipules none or very minute: fls. spicate at the ends of the branches or fascicled along the rachis, rarely racemose, white or yellow, hermaphrodite; calyx small, tube hemispherical, 5-lobed or rarely 5-parted; petals 5, linear or spatulate, claw elongated; stamens 5, inserted on the disk-margin, erect; ovary sessile, free, subglobose, 2–5-lobed or -parted, 2–5-celled: fr. splitting up into 2–5 globose, angular or winged indehiscent berries.—About 20 species, Austral.

monógyna, Labill. (*S. linariifòlia*, A. Cunn.). A half-hardy perennial herb, usually simple, about 1½ ft. high, with linear or lanceolate lvs. about 1 in. long: spikes at first dense, then lengthening to 4–6 in.: buds pinkish when young; fls. white. B.R. 1917.—The plant in the Californian trade is apparently not the above species, for it is described as a tall robust shrub with fl.-heads 1–2 in. across, surrounded by imbricated bracts and bright yellow fls. with a purple-streaked keel.

F. W. BARCLAY.
F. TRACY HUBBARD.†

STADMÁNNIA (named for Stadmann, a German botanist); also erroneously spelled *Stadtmannia*. *Sapindàceæ*. Branched pustulate trees, apparently very rarely cult.: lvs. alternate, without stipules, abruptly pinnate; lfts. 3–6 pairs, opposite and alternate, oblong, obtuse: panicles axillary, branched: fls. small, pedicelled, polygamo-dicœcious; calyx subspherical, 5-toothed; petals none; disk thick, raised and lobed; stamens 8; ovary oblong, 3-celled: berry dry, oblong-spherical, indehiscent.—The only species of this genus that is well known is a tropical tree from the Bourbon Isls., there known as bois de fer or ironwood. This is a large tree with hard, heavy reddish wood, once frequent in the primeval forests of Mauritius but now scarce. It is not known to be in cult. in Amer. Nine other names appear in Index Kewensis, apparently all Brazilian species, but one of them is a bare name and the others were first described in the early 1860's in Linden's catalogue.

oppositifòlia, Lam. (*S. Sideróxylon*, DC.). BOIS DE FER. Lvs. alternate, petioled, abruptly pinnate; lfts. 8–12, opposite, oblong, short-stalked, obtuse, coriaceous, entire, oblique at base: panicles dense, cylindrical, 3–4 in. long: fr. hard, globular, nearly 1 in. thick. Mauritius.

S. amábilis, Hort., is offered in the trade, but is not known botanically: it is said to be an imposing decorative plant for warmhouse cult. and to require the same treatment as gardenias.

F. TRACY HUBBARD.†

STAG-HORN FERN: *Platycerium*. **S. Sumach:** *Rhus*.

STANDARDS OF COLOR MEASUREMENT. There is no universally acknowledged standard of color measurement, nor any international agreement between physicists and artists as to the constituents of such a

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standard; consequently, those who wish to abide by some reliable system of color pitch and nomenclature are at liberty to choose between the publications of experts upon this subject without regard for professional or industrial limitations.

A standard of color exclusively useful in horticulture would be an absurdity, inasmuch as a standard would fail to be as far-reaching as the word implies if it did not meet the requirements of all classes of art, science, and industry. There is nothing logical in one normal red named one way for the horticulturist and another named differently for someone else. In the musical profession tone has been standardized by what is known as International Pitch at middle C of the pianoforte. All musical instruments throughout the world are commonly tuned to that pitch; it is an absolute standard. But as yet, the exact pitch of what is called normal red color is not standardized, and as a consequence the whole chromatic scale which by deduction and mathematical measurement should fall into line by the establishment of this one normal hue remains unfixed and is somewhat of a bone of contention between color experts.

A circle divided into the scientifically significant 360°, each one of which represents a distinct hue of the chromatic scale in tangible pigment, is by no means impossible though it is difficult of accomplishment. The writer successfully completed such a scale and finds it remarkably true to the scientific theory of color balance. At the present time, however, there is no mechanical process capable of reproducing such an exact scale with the fidelity it demands.

A diagrammatic representation of the color circle will be found on page 832, Vol. II, of this Cyclopedia, and the following table (Fig. 3675) indicates exactly the positions occupied in that circle of certain hues contained in the standards of authors mentioned below. A diligent comparison of the figures will demonstrate the lack of agreement among authorities.

Those independent standards of color which are accessible and have proved valuable as practical guides are the following: The extensive and admirable French work entitled, "Répertoire de Couleurs pour aider à la détermination des couleurs des Fleurs, des Feuillages et des Fruits, publié par la Société Française des Chrysanthémistes et Rèné Oberthür avec la collaboration principale de Henri Dauthenay," (etc.), Librairie Horticole, 84 bis Rue de Grenelle, Paris, 1905. "The Prang Standard of Color," Louis Prang, Boston, 1898, now out of print. The concise and reliable guide entitled "Elementary Color," and the invaluable and popular Bradley Educational Colored Papers, Milton Bradley Co., Springfield, Massachusetts, 1915. The extensive and portable "Ridgway Color Standard and Nomenclature," Robert Ridgway, Washington, D. C., 1912. "The Mathews Chart of Correct Flower Colors" with text, F. Schuyler Mathews, published in the American Florist for August 17, 1895, Chicago. The interesting work entitled 'Color Problems," a practical guide for the lay student of color, Emily N. Vanderpoel, Longmans, Green & Co., London and New York, 1902. See also the article on *Color in Flowers*, page 830, Vol. II, of this Cyclopedia, and for the theoretic basis of spectral color measurement, the article entitled "The World Beyond our Senses," by Carl Snyder, Harper's Magazine for June, 1903.

F. SCHUYLER MATHEWS.

A TABLE OF COMPARATIVE COLORS BASED UPON MATHEMATICAL INTERVALS OF 360° OF THE CHROMATIC CIRCLE.

NORMAL HUES	DEGREES	REPERTOIRE DE COULEURS	MILTON BRADLEY	ROBERT RIDGWAY	LOUIS PRANG	F. SCHUYLER MATHEWS	EMILY N. VANDERPOEL
YELLOW	1	PL. 90 NO 3 5 dull	1 pale	LEMON YEL. 1 pale	1 pale	1 pale	1 light
ORANGE	60	PL. 58 NO 4 60 bright	60 slightly light	ORANGE SCAR. 60 trifle dull	45 bright	50 dull	50 bright
SCARLET	80	PL. 62 NO 1 90 bright	R.O. 75 slightly light	80 clear	R.R.O. 90 bright	90 brilliant	—
RED	120	PL. 152 NO 4 120 bright	110 very intense	TYRIAN ROSE 122 bright	115 bright	120 bright	115 light
CRIMSON	130	PL. 155 NO 4 130 brilliant	—	—	R.R.V 130 dull pale	130 light	—
MAGENTA	140	PL. 188 NO 3 140 bright	V.R. 150 pale	RHODAMINE P. 140 brilliant	R.V 150 dull pale	140 dull pale	—
PURPLE	160	PL. 190 NO 4 165 dull	R.V. 170 pale	158 bright	V.R.V 160 dull pale	160 pale	—
VIOLET	180	PL. 192 NO 3 170 dull	180 dull pale	SPECTRUM V. 185 bright	175 dull pale	180 pale	185 light
ULTRAM	220	PL. 213 NO 3 230 grayish	—	PHENYL B. 220 lightish	B.B.V 220 dull pale	—	— 1916
BLUE	240	PL. 213 NO 3 245 clear	230 brilliant	METHYL B. 240 trifle dull	245 bright	250 light	245 pale
GREEN	300	PL. 237 NO 4 300 dull.	310 bright	EMERALD G. 305 clear	310 bright	—	305 light

3675. Standards of color.

STANGÈRIA (Wm. Stanger, of Natal). *Cycadàceæ.* A warmhouse cycad not very commonly cult.: caudex about a foot high, turnip-shaped: lvs. 3–4, long-petioled, about 2 x 1 ft., pinnate, very glabrous; pinnæ opposite and alternate, linear-lanceolate, spinulose-serrulate or subcrenate, rarely pinnatifid-lobed: male cone 6 x 1 in.; female cones smaller, 2–3 in. long.—One species, Subtrop. and S. E. Afr. Closely related to Encephalartos.

paradóxa, Moore. It is unique among the cycads by reason of the venation of its lfts.: in all the other members of the family the veins of the lf.-segms. are parallel and horizontal; in this one plant they are all free and run directly from the midrib to the margin. This pinnate venation is so extraordinary that the plant looks more like a fern than a cycad, and it was so described before the frs. were known. S. Afr. B.M. 5121. Gt. 63:1598. G.W. 6, p. 109. WILHELM MILLER.

STANHÒPEA (named for the Earl of Stanhope, president of the Medico-Botanical Society, London). *Orchidàceæ.* Epiphytic orchids easily grown and very interesting, but the fugacious character of their flowers has been unfavorable to their extensive cultivation.

Pseudobulbs clustered on the short rhizome, sheathed with scales and each bearing a single large plaited lf. contracted to a petiole at the base: fls. produced on thick scapes, which bore their way through the material in which they are planted and emerge from the bottom of the basket, large, fragrant, and curiously formed; sepals and petals usually reflexed, subequal or the petals narrower; labellum remarkably transformed, basal part or hypochil boat-shaped or saccate, often with two horns on the upper margin, passing gradually into the mesochil, which consists of a fleshy central part and two lateral horns; the terminal lobe or epichil firmly or movably joined to the mesochil, usually fleshy and keeled but not saccate, base of the labellum continuous with the long-winged column.—About 50 species inhabiting Trop. Amer. from Mex. to Brazil. The fls. expand with a perceptible sound early in the morning.

Stanhopeas enjoy a shady, moist location. A temperature of 60 to 65° F. at night and 70 to 75° during the day should be maintained in winter, with a gradual advance of 10° toward midsummer. They should be grown suspended from the roof in orchid cabins or terra cotta baskets with large openings at the bottom, and if drainage is used it should be placed in such a manner that it will not interfere with the exit of the pendulous flower-scapes. Equal parts chopped sphagnum and peat fiber forms a good compost. By severing the rhizome here and there between the old pseudobulbs, new growths will be sent up and thus the stock may be increased. (R. M. Grey.)

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KEY TO THE SPECIES.

A. *Labellum with an excavated or saccate base and a plane terminal lobe.*
B. *Mesochil and pleuridia wanting.* . . . . . 1. **eburnea**
BB. *Mesochil and pleuridia present.*
C. *Hypochil boat-shaped, short and sessile* . . . . . 2. **Wardii**
CC. *Hypochil boat-shaped, long and stalked.*
D. *Fls. pale yellow.*
E. *The hypochil white, crimson-spotted, with 2 large brown basal spots* . . . . . 3. **oculata**
EE. *The hypochil purplish crimson inside* . . . . . 4. **platyceras**
DD. *Fls. orange* . . . . . 5. **Bucephalus**
CCC. *Hypochil saccate or globose.*
D. *Epichil entire or obsolctely 3-toothed at the apex.*
E. *The hypochil spotted.*
F. *Purple inside; middle lobe cordate* . . . . . 6. **insignis**
FF. *Not purple; middle lobe triangular* . . . . . 7. **Shuttle-[worthii**
EE. *The hypochil not spotted, purple; middle lobe ovate* . . . . . 8. **devoniensis**
DD. *Epichil evidently 3-toothed at the apex.*
E. *Sepals and petals spreading, the former broadly ovate.*
F. *Fls. yellow* . . . . . 9. **tigrina**
FF. *Fls. white* . . . . . 10. **Martiana**
EE. *Sepals and petals strongly reflexed, the former oblong-ovate or oblong-lanceolate* . . . 11. **saccata**
AA. *Labellum reduced to a saccate pouch* . . . . 12. **ecornuta**

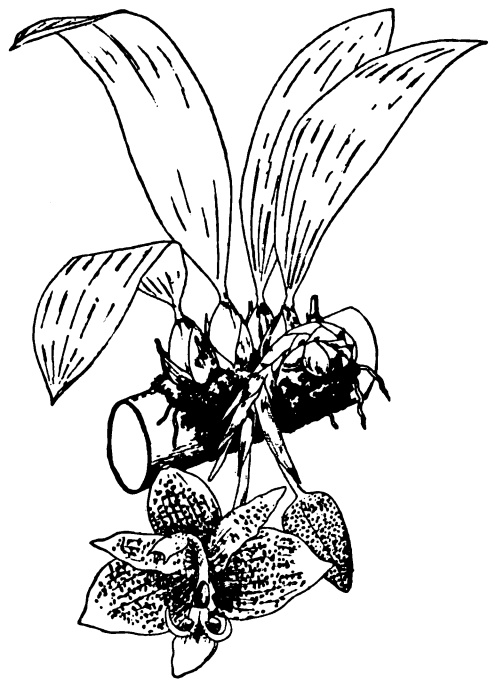
1. **ebúrnea,** Lindl. (*S. grandiflòra*, Lindl. *S. calceolàta*, Hort.). Pseudobulbs conical, 1½ in. long: lvs. leathery, 8–12 in. long: scapes pendulous, with small bracts, 2–3-fld.: fls. 5 in. across, ivory-white; sepals broad; petals narrow; labellum 3 in. long, solid, fleshy, excavated at the base and bearing 2 hooked horns over the mouth, spotted above with reddish purple; column pale green, with broad wings toward the apex. Guiana. B.M. 3359. B.R. 1529. I.H. 14:531 (as var. *spectabilis*). L.B.C. 15:1414 (as *Ceratochilus grandiflorus*).

2. **Wàrdii,** Lodd. Pseudobulbs 2 in. long: lvs. large, broad, and leathery: fl.-st. 9 in. long, bearing 3–9 fls., which are bright yellow to golden orange, spotted with crimson; lateral sepal round-oblong, concave, acute; petals lanceolate, revolute, the cavity in the base of the labellum deep velvety purple. Aug. Mex. and S. B.M. 5289. Gn. 51, p. 28. C.O. 2. Var. **aùrea,** Hort. (*S. aùrea*, Lodd.). Fls. golden yellow, with 2 dark spots on the hypochil. Fragrant.

3. **oculàta,** Lindl. (*S. guttulàta*, C. Koch). Fig. 3676. Lvs. ovate, with a blade 1 ft. long: scape 1 ft. long, clothed with scarious pale brown sheaths, 3–6-fld.: fls. 5 in. across, very fragrant, pale yellow, thickly spotted with purple; sepals 3 in. long, reflexed; petals half as large; hypochil narrow, white, spotted with crimson and having 2 large dark brown spots near the base. Mex. B.M. 5300. B.R. 1800. L.B.C. 18:1764 (as *Ceratochilus oculatus*). S.H. 2, p. 435. G.C. III. 19:264; 43: 19; 44:115; 52:121. J.F. 3:309–10. C.O. 6.—There are several varieties, differing in color and markings. Fig. 3676 is from an article by Safford on "Sacred Flowers of the Aztecs," named "the serpent-head orchid," in The Volta Review.

4. **platycèras,** Reichb. f. Pseudobulbs and lvs. as in *S. Bucephalus* but stouter: scape 2-fld., with ovate acute bracts half as long as the ovary: fls. 7 in. across, pale yellow, with numerous ring-shaped spots and blotches of purple; sepals triangular-oblong; petals broadly linear, acute; hypochil boat-shaped, 2½ in. long; horns 1 in. long, broad, pointing forward, parallel with the tongue-shaped middle lobe; the hypochil is deep purplish crimson inside, paler and spotted outside, the upper part of the labellum colored like the sepals. Colombia. Gn. 33:534.

5. **Bucéphalus,** Lindl. (*S. grandiflòra*, Reichb. f.). Pseudobulbs crowded, rugose: lvs. petioled, 9 in. long, pointed: the pendulous raceme bearing 4–6 large,



3676. Stanhopea oculata. (× about ½)

tawny orange fls. marked with large crimson spots; sepals and petals reflexed, the former broad; lower part of the labellum curved, boat-shaped, bearing 2 curved horns and a broad fleshy middle lobe; column green and white, spotted with purple. Aug. Mex., Peru. B.M. 5278; 8517. B.R. 31:24.—Fls. very fragrant. Distinguished by its very short ovaries.

6. **insignis,** Frost. Figs. 3677, 3678. Pseudobulbs clustered: lvs. broadly lanceolate: scape 6 in. long, covered with dark brown scales, 2–4-fld.: fls. 5 in. across, dull yellow, spotted with purple; sepals broad, concave; petals narrow, wavy; hypochil globose, almost wholly purple inside, heavily spotted outside, horns 1 in. long, falcate, middle lobe cordate, keeled. July–Oct. Brazil. B.M. 2948, 2949. B.R. 1837. L.B.C. 20:1985. Gng. 2:117 (from which Fig. 3677 is adapted). G.W. 12, p. 283.—Marked by broad wings of column.

7. **Shúttleworthii,** Reichb. f. Pseudobulbs large, conical, sulcate: lvs broadly oblong, acute: raceme pendulous, loose: sepals, petals, and base of the labellum apricot-color with dark purplish blotches, front part of the labellum yellowish white; hypochil semi-globose; horns flattened, suberect, terminal lobe triangular; column whitish, green along the middle and spotted with purple in the inside. Colombia.

8. **devoniénsis,** Lindl. (*S. maculòsa*, Knowles & Westc.). Lvs. about 9 in. long: scape pendulous, 2–3-

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fld.: fls. 5 in. across, pale brownish, with broad reddish brown blotches; sepals oblong to ovate-oblong, obtuse; petals narrow; hypochil rounded, saccate, purple, horns incurved, middle lobe ovate, channeled, obscurely 3-toothed. Peru. F.S. 10:974. F.C. 3:121.

9. **tigrìna,** Batem. Lvs. and pseudobulbs as in the genus: scape short, pendulous, clothed with large, thin brown scales: fls. 6 in. across, waxy and very fragrant; sepals broadly ovate, concave; petals oblong-lanceolate, both dingy yellow mottled toward the base with large blotches of dull purple; hypochil broad, cup-shaped; horns 1 in. long, fleshy, bent forward at right angles; middle lobe rhomboid, with 3 fleshy teeth at the apex; column large, spatulate. Mex. B.M. 4197. B.R. 25:1. G.M. 32:398; 38:149. F. 1845:59. G.C. III. 4:481. C.O. 7.—One of the most striking forms among orchids. Var. **lutéscens,** Hort. Brilliant yellow to orange marked with chocolate. Guatemala. Var. **supérba,** Hort. Van Houtte. Fls. yellow, with the sepals and petals heavily blotched with reddish brown. F.S. 7:713–15. G.M. 51:625. Var. **atràta,** Hort., is advertised. Var. **spléndens,** Hort., had deeper-colored fls.

3677. Stanhopea insignis.

10. **Martiàna,** Batem. Lvs. lanceolate: sepals broadly ovate, creamy white with few purple spots on the lower half; petals narrower, blotched with purplish crimson; hypochil saccate, white; lateral horns broad, pointed, middle lobe oblong, obscurely 3-toothed; column subclavate, winged. Mex. F.S. 20:2112, 2113. Gn. 45, p. 470. G. 17:187. Var. **bícolor,** Lindl. Ground-color of the fls. white. B.R. 29:44. G.W. 15, p. 457.

11. **saccàta,** Batem. Fls. smaller than those of the other species, greenish yellow, changing to deeper yellow at the bases of the segms., regularly speckled with brown; lateral sepals ovate-oblong, the upper one oblong-lanceolate; petals narrower, oblong, all reflexed; hypochil deeply saccate; horns flat, a little twisted, epichil quadrate. Guatemala. I.H. 8:270 (as *S. radiosa*).

12. **ecornùta,** Lem. Pseudobulbs and lvs. large: scape short, clothed with green bracts, 2-fld.: sepals erect, 2 in. long, ovate, concave, white, petals smaller; labellum reduced to a fleshy sac-like hypochil, 1½ in. long, yellow deepening to orange at the base; column as long as the labellum and of the same color. Cent. Amer. B.M. 4885. F.S. 2:181. G.C. 1850:295.

S. Amesiàna, Hort.=S. Lowii.—*S. bellæréneis*=S. insignis × S. oculata. R.H. 1896:232.—*S. convolùta,* Rolfe. Sepals and petals ivory-white, the latter with buff tips, the sepals elliptic-oblong, spreading, 2½–3 in. long, 1¼–1¾ in. wide, the petals connivent, inclosing column, about 2 in. long, 1¼ in. wide; lip buff-yellow, with the interior of hypochil orange, over 1½ in. long, 3-lobed; hypochil subglobose; epichil oblong, truncate. Colombia. B.M. 8507.—*S. costaricénsis,* Reichb. f. Fls. 4½–5 in. across, pale yellow, densely purple-dotted; lip with 2 prominent keels on each side; column with small triangular wing at apex. Costa Rica.—*S. elegántula,* Rolfe. Fls. primose-yellow, with base of petals and hypochil of lip orange, sparsely dotted with brown. Hab.(?).—*S. flórida,* Reichb. f. Infl. dense, about 7-fld.: fls. white, the inside of sepals and petals spotted with purple; lip with numerous small purple dots, the hypochil with a large blotch on each side. S. Amer. G.C. II. 16:561, 565; III. 19:265.—*S. gravèolens,* Lindl. Fls. ample; sepals greenish white flushed yellowish; petals pale yellow, oblong-ligulate, undulate, shortly acuminate; lip with the hypochil apricot; mesochil white; epichil entire, oval, pointed, white, purple-dotted. Guatemala. G.W. 3, p. 472. C.O. 4.—*S. Haselovìana,* Reichb. f. Fls. 6 in. across; sepals and petals dull gray on back, dull yellowish on surface, covered with annular pale rose spots; lip spotted with dark purple; hypochil quadrate; epichil 3-parted. Peru. B.M. 7452.—*S. inodòra,* Lodd. Lateral sepals ovate-oblong; hypochil subcompressed, short, saccate; epichil orbicular-ovate, entire; fls. pale flushed with yellow. Mex. B.R. 31:65. G.M. 57:54. G.W. 7, p. 27.—*S. Langlasseàna,* Cogn. Lip erect, rigid, closely pressed against the erect column; petals ascending, pressed against the column; sepals extended horizontally. Trop. Amer.—*S. Lòwii,* Rolfe. Sepals and petals creamy buff, the latter brown-dotted; lip ivory-white, the hypochil branded with dull maroon. Colombia. G.M. 36:352. G.C. III. 14:689. J.H. III. 45:193.—*S. Madouxiàna,* Cogn. Fls. fragrant, 5–7 in. across; sepals and petals cream-white, with large spots of carmine-rose, the sepals triangular-oval, obtuse, the petals broadly oblong, obtuse, undulate; lip fleshy, in color like sepals and petals, the inside of hypochil tinged with violet-black; epichil oval, pointed. Colombia. G.C. III. 24:135. C.O. 1.—*S. nigripes,* Rolfe. Sepals and petals yellow, with numerous small purple blotches, the sepals elliptic-oblong, acute, the petals linear-oblong, acute, undulate; lip yellowish white, purple-spotted at base and on epichil, the hypochil with a dark black-purple eye-like spot on each side, the inside the same color, the epichil ovate-orbicular. Origin unknown.—*S. peruviàna,* Rolfe. Fls. golden yellow; sepals obtuse, the dorsal oblong, the lateral obliquely and broadly ovate; petals linear-oblong, revolute; lip with the hypochil suffused dark purple on sides; epichil orbicular-ovate, purple-spotted. Peru. B.M. 8417.—*S. Ràndii,* Rolfe. Fls. ivory-white, faintly shaded yellow on lip; sepals elliptic-oblong, acute; petals lanceolate-oblong, acute, lip with the hypochil papillate inside, the epichil triangular, acute. Brazil.—*S. Rodigasiàna,* Claes. Fls. about 6 in. across; sepals spreading, oblong-ovate, purple-marbled below, maroon-blotched above; petals triangular-lanceolate, attenuate above, pale green; lip very fleshy, the hypochil suffused with maroon-purple below, the remainder blotched; epichil reticulated, triangular, obtuse, spotted with dull purple. Colombia. B.M. 7702. G.M. 41:492. G.C. III. 24:31.—*S. Rùckeri,* Lindl. Resembles S. Wardii in color, but paler; hypochil obovate; epichil stained pink. Mex. A.F. 6:631.—*S. stenochìla,* F. C. Lehm. & Kränzl. Sepals pure white; petals apricot-colored, with purplish blotches; lip ivory-white at base, middle and interior parts yellow. Colombia.—*S. Wolteriàna,* Kränzl.=S. Martiana × S. tigrina. Fls. dull straw-color or pale orange; sepals obscurely marked with wine-red, the spots on the petals larger. G.C. III. 38:102.

HEINRICH HASSELBRING.
GEORGE V. NASH.†

STANLÈYA (named for Edward Stanley, Earl of Derby, 1779–1849). *Cruciferæ.* Glaucous glabrous perennial herbs, similar to arabis in habit, suitable for the flower-garden: lvs. undivided or pinnatifid: racemes elongated, strict, many-fld.; fls. yellow; buds elongated, sepals short, spreading; petals narrow, elongated, long-clawed: silique long-stipitate, slender, 4-cornered to rather terete, compressed, valves carinately 1-nerved.—About 10 species, Calif.

pinnàta, Brit. (*S. pinnatifida,* Nutt.). Sts. flexuous: lvs. very variable, commonly pinnatifid; segms. lance-oblong or oblanceolate-elliptic, rarely linear, almost entire; terminal segm. larger: fls. deep golden yellow, according to D. M. Andrews. May–July. W. Kans. and Neb. to Texas and S. Calif., in dry clay or alkaline soils.

3678. Stanhopea insignis. (×⅓)

G.C. III. 29:381.—A hardy perennial herb about 3 ft. high with the general appearance of a cleome and fls. about 1 in. across borne in terminal spikes a foot or more long.

F. TRACY HUBBARD.†

STAPÈLIA (J. B. Van Stapel, Dutch physician, died in the early part of the seventeenth century, who wrote on the plants of Theophrastus). *Asclepiadàceæ.* CARRION FLOWER. Odd fleshy cactus-like plants usually grown with greenhouse succulents, both for the great oddity of their forms and for the singular and often large showy flowers.

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Stems low, leafless, coarsely 4-angled, the angle coarsely dentate, usually more or less covered with tubercles and excrescences: fls. often large, generally fetid and commonly arise from the angles and notches of the sts., apparently in no regularity and are usually grotesquely barred and mottled with dark or dull colors; calyx and corolla 5-parted, corolla-segms. spreading, usually narrow and fleshy, mostly purple or marbled, in some species pale; crown in 2 rows, the outer horizontally spreading, deeply 5-lobed, the lobes entire or shortly 2–3-cleft, the inner of 5 scales adnate to the base of the anthers: fr. of 2 follicles, containing comose seeds.—About 60 species according to N. E. Brown in Dyer, Flora Capensis, vol. 4 (1909); Schumann, in Engler & Prantl's Pflanzenfamilien, considers that the genus contains 70–80 species; Decaisne, in DeCandolle's Prodromus, 8 (1844), describes 89 species, and makes references to several more. S. Afr. chiefly, 3 or 4 in Trop. Afr. Some of the species have fls. several inches across, although the plants themselves are relatively small; in fact, the fls. of *S. gigantea* are a foot across.

Most of the stapelias demand the treatment given to Cape euphorbias and to cacti,—a light, airy, rather dry position during the growing and blooming seasons and a soil made porous with rubble. They are mostly summer and fall bloomers. They should remain dormant in winter. Propagated easily by cuttings. They do best, however, when not grown so dry as cacti are grown. (See under Succulents, p. 2674.) The stapelias are known in cultivation mostly in botanic gardens and in the collections of amateurs. Only a few names occur in the American trade, and one of these (*S. cylindrica*) is an Echidnopsis. Several other species are likely to be found in fanciers' collections.

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KEY TO THE SPECIES.

A. *Corolla without a distinct raised ring on the disk.*
  B. *Inner surface of the disk and lobes glabrous and rugose or smooth.*
    C. *The corolla-lobes extended not more and usually less than 2 in. diam. (except perhaps in No. 9).*
      D. *Lobes of the corolla nearly smooth, ciliate with long flattened tapering hairs* ..... 9. **bella**
      DD. *Lobes of the corolla very distinctly ciliate with simple hairs* ..... 8. **similis**
    CC. *The corolla-lobes extended 2½–7 in. diam.*
      D. *Lobes of the corolla ciliate with simple hairs* ..... 6. **Pillansii**
      DD. *Lobes of the corolla not ciliate* .. 7. **glabriflora**
  BB. *Inner surface of the disk or disk and lobes hairy, besides the border of cilia, usually transversely rugose.*
    C. *Corolla-lobes extended 8–14 in. diam., lobes 2⅜–5½ in. long.*
      D. *Center of corolla shallowly depressed* ..... 3. **gigantea**
      DD. *Center of corolla cup-shaped, about 1⅛ in. deep* ..... 4. **nobilis**
    CC. *Corolla-lobes extended 4½–6½ in. diam., lobes 1½–2¾ in. long.*
      D. *Transverse yellow lines on corolla absent* ..... 2. **grandiflora**
      DD. *Transverse yellow or whitish lines on corolla present* ..... 1. **hirsuta**
    CCC. *Corolla-lobes extended 3–4½ in. diam., lobes 1⅛–1¾ in. long...* 1. **hirsuta var.**
    CCCC. *Corolla-lobes extended 2–3 in. diam., lobes 1–1¼ in. long.*
      D. *Disk of corolla shortly and usually thinly pilose or pubescent with erect hairs* ..... 11. **maculosoides**
      DD. *Disk of corolla thickly or densely covered with fine long hairs...* 5. **tsomoensis**
AA. *Corolla with a distinct raised ring or cushion on the disk.*
  B. *Inner lobes of the crown sometimes slightly humped at the base or connected to the outer row, but not produced into a distinct dorsal horn (see also No. 12 in which the outer horn is sometimes not more than ¼ line long)* ..... 13. **namaquensis**
  BB. *Inner lobes of crown distinctly 2-horned.*
    C. *Annulus or ring ½–2 lines high, erect, very obtuse or rounded at the top, not cushion-like nor with a spreading or recurved margin.*
      D. *The corolla pale yellowish or light yellow with spots and transverse lines on the basal part of the lobes dark purple-brown to dull purple, and their tips often entirely purple-brown, or in the variety entirely dark purple-brown with inconspicuous transverse yellow lines* ..... 10. **mutabilis**
      DD *The corolla pale yellow, sprinkled all over with dots or small spots of purple-brown, lobes 5–10 lines long, not ciliate* ..... 12 **pulchella**
    CC. *Annulus or ring very prominent, with an acute edge to the horizontally spreading or recurved margin* ..... 14. **variegata**

1. **hirsùta,** Linn. Sts. erect, 5–8, occasionally 12 in. high, softly puberulous, green: fls. 1–3 together, near the base of young sts.; corolla 4–5 in. diam., basal half of lobes cream-color, more or less tinted with purplish on the disk, upper half very dark purple-brown, marked with transverse cream-colored or yellowish and purple-brown lines, white-hairy. S. Afr. Var. **unguipétala,** N. E. Br. (*S. unguipétala,* N. E. Br.). Corolla 3½–4½ in. diam., disk with the center and 5 bands radiating to the sinuses, pale greenish ochre, margins of the upper half of the lobes much revolute, tips upcurved. S. Afr. G.C. II. 7:335; III. 44: 169.

3679. Stapelia grandiflora. (×½)

2. **grandiflòra,** Mass. Fig. 3679. Sts 6–12 in. high, gray-velvety-pubescent, with very compressed angles: fls. 1–3 together, near the base of the sts.; corolla 5–6 in. diam., velvety-pubescent, inner face dark purple-brown, lobes ciliate, darkest toward the tip, upper half rugose and transversely rugose, without markings, basal half white or pale-purple-haired. S. Afr. G.L. 27:67. R.B. 40, p. 186. R.H. 1858, p. 154.

3. **gigantèa,** N. E. Br. Sts. erect, branching from a short decumbent base, 4–8 in. high, pubescent, light

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dull green, angles much compressed: fls. 1 or 2 together, near the base or toward the middle of the sts.; corolla 11–16 in. diam., disk-like, center shallowly depressed, inner surface transversely rugulose, pale-purple-hairy, light ochre-yellow, everywhere marked with transverse crimson lines, lobes 4–6¼ in. long. Trop. and S. Afr. B.M. 7068. G.C. II. 7:693; III. 4:729. G.F. 8:515. —"The requirements of *S. gigantea*," Watson writes, "are somewhat exceptional. It thrives only when grown in a hot, moist stove from April till September, when the growth matures and the flower-buds show. It should then be hung up or placed upon a shelf near the roof-glass in a sunny dry position in the stove."

4. **nóbilis,** N. E. Br. Sts. erect, decumbent and branching at base, 3–5 in. high, sides concave, softly pubescent, green: fls. 1–5 together, near the base or middle of the young branches; corolla very large, with a distinct campanulate tube about 1⅛ in. deep, lobes 2¾–4 in. long, light reddish purple on the back, inner face transversely rugulose, light ochre-yellow everywhere marked with irregular transverse crimson lines. S. Afr. B.M. 7771.

5. **tsomoénsis,** N. E. Br. Sts. 4–6 in. high, angles compressed and somewhat repand-dentate, opaque green: fls. 4–9 together, near the base of the young sts.; corolla 2½–3 in. diam., outside glabrous, light green, inside with a few raised transverse ridges on the upper half of the lobes, entirely dull smoky purple, darker at the tips of the lobes. S. Afr.

6. **Pillánsii,** N. E. Br. Sts. rather crowded, 4–7 in. high, sides concave, angles not much compressed, velvety-pubescent, green: fls. 2–5 together, near the base of the sts., 4–5½ in. diam., inner surface transversely rugose and glabrous, purple-brown without markings, shining, densely ciliate with soft light purple, simple hairs. S. Afr. G.C. III. 35:242; 44:187.

7. **glabriflòra,** N. E. Br. (*S. glabriflòlia,* Bailey, error. *S. grandiflòra* var. *mìnor,* Hort.). Sts. erect, 4–9 in. high, puberulous, green, angles much compressed: fls. 1–2 together at the middle or lower part of young sts.; corolla 3–4½ in. diam., velvety on the back, transversely rugose and quite glabrous on the inner face, not ciliate, dull reddish purple, darker at tips of lobes, whole surface transversely marked with very narrow linear, irregular yellowish white lines. S. Afr. G.C. II. 6:809; III. 44:186.

8. **símilis,** N. E. Br. Sts. erect, 3–6 in. high, 4–6-angled, minutely puberulent, dull purple or gray-green, purple-spotted; angles somewhat denticulate: fls. 3–6, borne at the base of the st.; corolla rotate, less than 1 in. across, outside minutely puberulent, inside transverse rugose, glabrous, not ciliate, dark purple, lobes ovate, acute. S. Afr.

9. **bélla,** Berger. Sts. erect, branching at or above the base, 5–7 in. high, sides concave, minutely pubescent, dull green: fls. 3–4 together at the base of the young sts.; corolla 1¾–2 in. diam., glabrous inside and out, inner face deep purplish red, browner toward the tips of the lobes, paler at the center, the small tube whitish, without markings, ciliate on the lobes. A hybrid of European raising. G.C. III. 31:138; 44: 168.

10. **mutábilis,** Jacq. Sts. 3–18 in. high, acutely 4-angled, with rather stout conical, spreading teeth, glabrous, green, sometimes tinged with purple, slightly glaucous: fls. 1–3 together, from near the base of the younger or higher up on the older sts.; corolla with lobes very much recurved and then about 1½ in. diam., glabrous on both surfaces, inner face slightly rugose to nearly smooth, the upper third of the lobes light or dark purple-brown, the remainder pale yellowish or greenish yellow, covered with transversely elongate spots or thick or narrow, irregular transverse purple-brown lines. S. Afr. Var. **díscolor,** N. E. Br. (*S. díscolor,* Tod.). Corolla dark purple-brown with inconspicuous yellowish transverse lines on parts of the disk; annulus yellow with irregular purple lines. S. Afr.

11. **maculosoides,** N. E. Br.; also erroneously spelled *masculosoides.* Sts. erect, about 3 in. high, obtusely 4-angled, glabrous: corolla about 2¾ in. diam., glabrous outside, center dark violet-purple, lobes 12–13 lines long, slightly rugose, marked with dark violet-purple transverse lines and spots on a light yellowish ground on the central part and with dark violet-purple margins and tips, ciliate. Probably a European hybrid.

12. **pulchélla,** Mass. Sts. 2–4 in. high, erect or decumbent at base, obtusely 4-angled, glabrous, green: fls. usually 3 or more together, near the base of the sts.; corolla 1¼–2¼ in. diam., smooth on the back, minutely tuberculate-rugulose and glabrous inside, not ciliate, sulfur-yellow, covered with numerous purple-brown dots, lobes sometimes narrowly edged with purple-brown. S. Afr.

13. **namaquénsis,** N. E. Br. Sts. procumbent or decumbent, 1½–3¼ in. high, obtusely 4-angled, with very stout, acute, conical spreading teeth, glabrous, green, marked with irregular purple stripes: fls. 1–4 together, near the base or middle of the young sts.; corolla 3–4 in. diam., back smooth and glabrous, inner surface very rugose with transverse papillate ridges on the lobes which are 1–1¼ in. long, yellow, dotted with purple-brown. S. Afr. Var. **ciliolàta,** N. E. Br. (*S. ciliolàta,* Ruest, not Tod.). Corolla shortly ciliate, with simple or subclavate white or white and dark purple hairs mixed, spotting variable.

14. **variegàta,** Linn. (*S. normàlis,* Jacq.). Plant glabrous: sts. erect from a decumbent base, 2–6 in. high, very obtusely 4-angled, green, often mottled all over or tinted with purple at the tips: fls. 1–5 together, at base of young sts.; corolla 2–3 in. diam., lobes smooth and green outside, inner surface rugose with crowded irregular transverse ridges on the lobes, pale greenish yellow, with dark purple-brown spots. S. Afr. B.M. 26. R.H. 1857, p. 43. Var. **atràta,** N. E. Br. (*S. atràta,* Tod.). Corolla-lobes deltoid-acuminate, ground-color dark purple-brown. Var. **atropurpùrea,** N. E. Br. (*S. atropurpùrea,* Salm-Dyck). Corolla-lobes ovate; ground-color blackish purple. Var. **clypeàta,** N. E. Br. (*S. Bufònis,* Sims). Corolla 2½–3 in. diam. spotted all over, with or without a few slender transverse lines at the base of the lobes. B.M. 1676. Var. **Cúrtisii,** N. E. Br. (*S. Cúrtisii,* Schult.). Outer lobes of crown very slightly notched; ground-color of corolla light yellow or rather bright sulfur-yellow. Var. **mixta,** N. E. Br. (*S. mixta,* Mass.). Corolla 2½–3¾ in. diam., light-colored; lobes with numerous rounded spots, those of the basal half connected by slender transverse purple-brown lines. Var. **trisúlca,** N. E. Br. (*S. trisúlca,* Donn.). Corolla in mature bud flat-topped, without a point, when expanded flat on the back of the disk.

S. álbicans, Sprenger. A hybrid with partly whitish sts.: corolla 2–2½ in. diam., dark purple-brown at the tips of the lobes, otherwise yellow with purple-brown transverse lines.—*S. Astèrias,* Mass. STARFISH FLOWER. Dwarf: sts. mostly curved: corolla 4–5 in. diam., with spreading star-like segms., violet-purple with transverse, yellowish bars. B.M. 536. L.B.C. 5:453.—*S. atrosanguínea,* N. E. Br., with intense blackish crimson fls. is in reality a Caralluma, C. atrosanguinea, N. E. Br.—*S. cantabrig·énsis,* Berger (S. hybrida cantabridgensis). Hybrid: corolla 6½–8 lines across, broadly campanulate, greenish, suffused with red outside, brown-red inside, rather densely covered with red-brown hairs.—*S. Càroli-Schmídtii* is offered in the German trade.—*S. cylíndrica,* Hort.=Echidnopsis cereiformis.—*S. divérgens,* N. E. Br. Hybrid: corolla about 2 in. diam., inner surface slightly rugulose, light yellow, irregularly marked with brownish crimson lines.—*S. Engleriàna,* Schlecht. Fls. solitary; corolla dark brown, lobes triangular. S. Afr.—*S. Flèckii,* Berger & Schlecht., is offered in the German trade. S. E. Afr.—*S. fœtida,* Hort., is an American trade name which might apply to any species in the genus.—*S. Hanburyàna,* Berger & Ruest. Hybrid: corolla about 2½ in. diam., inner surface somewhat rugose, lobes pale greenish yellow, evenly marked all over with small transverse, purple-brown spots or short lines, narrowly edged with the same color.—*S. Leendértziæ,* N. E. Br. St. erect from a decumbent base, 3–5 in. high: corolla large, campanulate, tube 2–2½ in. long, 1¾–2¼ in. across, dull fuscous-purple. Trans-

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vaal. B.M. 8561.—*S. longipedicellàta*, N. E. Br. (S. kwebensis var. longipedicellata, Berger). Sts. clustered, erect, 4–6 in. high: corolla 1½–1¾ in. across, tube short, purplish, lobes blackish. Trop. Afr.—*S. luxùrians*, Dammann. Hybrid: corolla about 3 in. diam., not ciliate, entirely dark purple-brown.—*S. mágna*, Berger. Hybrid: corolla dark brown, with yellowish markings, with violet-red curled hairs.—*S. Plántii*, Hort. Sts. stout and erect: corolla about 5 in. diam., hairy, brown barred with yellow, lobes margined with brown-purple. S. Afr. B.M. 5692. F.S. 19:2012.—*S. pórtæ-taurinæ* is offered in the German trade.—*S. pùtida*, Berger. Hybrid: sts. 1½–2 in. high: corolla-lobes yellowish with large purple-brown spots and a red line along the margin, not ciliate.—*S. rectiflòra*, Ruest. Hybrid: corolla about 2 in. diam. with a shallow cup-like disk and spreading sulfur-yellow lobes, with rounded and not very numerous purple-brown spots often confluent in longitudinal rows.—*S. Schínzii*, Berger & Schlecht., is offered in the German trade. S. E. Afr.

F. Tracy Hubbard.†

STAPHYLÈA (Greek, *staphyle*, cluster, referring to the inflorescence). *Staphyleàceæ*, formerly referred to the *Celastràceæ*. Bladder-Nut. Ornamental woody plants chiefly grown for their attractive white flowers and for their handsome foliage, and also for the inflated pod-like fruit.

Deciduous shrubs or small trees, with smooth striped bark: lvs. opposite, 3–7-foliolate; lfts. serrulate, like the lvs. stipulate: fls. perfect, 5-merous in terminal panicles; sepals and petals 5, of about the same length, upright; stamens 5; pistils 2–3, usually connate below: fr. a 2–3-lobed, inflated, membranous caps., with 1 or few subglobose rather large, bony seeds in each cell.—Eleven species in the temperate regions of the northern hemisphere.

The bladder-nuts are upright shrubs or small trees with handsome bright or light green foliage and ornamental white or pinkish flowers in nodding clusters followed by bladder-like fruits conspicuous by their size and pale green color. The species are all inhabitants of temperate regions, and *S. trifolia*, *S. Bumalda* and *S. pinnata* are hardy North, while *S. colchica*, *S. Bolanderi*, and *S. holocarpa* are hardy at least as far north as Massachusetts; *S. emodi* is more tender and seems not to be in cultivation in this country. They are all desirable shrubs and flower in early summer after the leaves except *S. holocarpa* which blooms in spring before or with the leaves. They are well adapted for shrubberies, but all except *S. Bumalda* are liable to become bare and unsightly at the base and are therefore not to be recommended for single specimens. *S. holocarpa* is perhaps the most beautiful species in bloom; also *S. elegans*, *S. colchica*, and *S. Bumalda* have very handsome flowers. *S. colchica* blooms at an early age and is sometimes forced, but *S. holocarpa* is probably even better adapted for that purpose. Staphyleas grow well in almost any kind of soil and position, but do best in a somewhat moist rich earth and partly shaded situation. They are always interesting although not showy. Propagation is by seeds, layers, and suckers. Greenwood cuttings from forced plants root readily.

A. *Lvs. 5–7-foliolate, only occasionally 3-foliolate: panicles stalked.*

B. *Panicle raceme-like, oblong, pendulous: fl.-buds subglobose.*

pinnàta, Linn. Upright shrub, attaining 15 ft., sometimes tree-like: lfts. 5–7, ovate-oblong, long-acuminate, sharply and finely serrate, glabrous and glaucescent beneath, 2–3 in. long: panicles 2–5 in. long, on peduncles about 2 in. long: sepals oval, whitish, greenish at the base, reddish at the apex, about as long as the oblong petals: caps. 2–3-lobed, much inflated, subglobose, about 1 in. long. May, June. Eu. to W. Asia. Gn. 34, p. 280. G. 4:473. H.W. 3, p. 52.

BB. *Panicle broad, upright or nodding: fl.-buds obovate-oblong.*

cólchica, Stev. (*Hoïbrénkia formòsa*, Hort.). Upright shrub, attaining 12 ft.: lfts. usually 5, sometimes 3, oblong-ovate, acuminate, sharply serrate, glabrous and pale green beneath, 2–3 in. long: panicle 2–3 in. long and almost as broad, on a peduncle 2–3 in. long: sepals narrow-oblong, spreading, yellowish white; petals linear-spatulate, white: caps. obovate, much inflated, 1½–2 in. long. May, June. Caucasus. B.M. 7383. R.H. 1870, p. 257. J.H. III. 34:183. F. 1879, p. 123. G.C. II. 11:117; III. 2:713; 10:161. A.G. 18:423. Gt. 24:837; 37, p. 501. Gn. 34, p. 281; 76, p. 171. G. 2:323; 26:115 (forced plant); 27:170. G.M. 55:215. Gn.W. 5:49; 23:57. F.E. 23:585.—Var. **Coulombièri,** Zabel (*S. Coulombièri*, André). Of more vigorous growth, with denser foliage: lvs. larger and longer-stalked; lfts. long-acuminate: stamens glabrous: caps. 2–4 in. long, spreading at the apex.

AA. *Lvs. 3-foliolate.*

B. *Middle lft. short-stalked, stalk ½in. or less long: panicle sessile.*

Bumálda, DC. Shrub, 6 ft. high, with upright and spreading slender branches: lfts. broadly oval to ovate, shortly acuminate, crenately serrate, with awned teeth, light green, almost glabrous, 1½–2½ in. long: fls. about ⅛in. long, in loose, erect panicles 2–3 in. long; sepals yellowish white, little shorter than the white petals: caps. usually 2-lobed, somewhat compressed, ¾–1 in. long. June. Japan. S.Z. 1:95.

BB. *Middle lft. slender-stalked: panicles stalked.*

C. *Fls. after the lvs.*

trifòlia, Linn. American Bladder-Nut. Fig. 3680. Upright shrub, with rather stout branches, 6–15 ft. high: lfts. oval to ovate, acuminate, finely and sharply serrate, slightly pubescent beneath or almost glabrous, 1½–3 in. long: fls. about ⅛in. long, in nodding panicles or umbel-like racemes; sepals greenish white, petals white: caps. much inflated, usually 3-lobed, 1⅓–2 in. long. April, May. Que. to Ont. and Minn., south to S. C. and Mo. Gt. 37, p. 529. Var. **paucifòra,** Zabel. Low and suckering: lfts. smaller, broader, glabrous at length: fls. in short, 3–8-fld. racemes: fr. often 2-lobed, 1⅓–1½ in. long.

3680. Staphylea trifolia. (×¼)

Bòlanderi, Gray. Fig. 3681. Shrub: lfts. broadly oval or almost orbicular, acute, sharply serrulate, glabrous, 2–3 in. long: fls. in many-fld. nodding panicles; stamens and styles exserted: fr. 3-lobed, much inflated, 2–2½ in. long. Calif., in the Sierra Nevada region. G.F. 2:545 (adapted in Fig. 3681). R.H. 1910, p. 305.—A rare shrub, probably not regularly in cult.

CC. *Fls. before the lvs.*

holocárpa, Hemsl. Shrub or small tree, to 25 ft.: lfts. 3, oval to ovate-oblong, short-acuminate, serrulate, pale and reticulate and glabrous or nearly so beneath, 2–4 in. long: fls. white or pinkish, nearly ½in. long, in pendulous slender-stalked panicles 1–4 in. long, axillary on last year's branchlets: fr. pear-shaped or ellipsoid, abruptly acuminate or sometimes lobed at the apex, 1½–2 in. long; seeds light grayish brown, lustrous, ¼in. long. Cent. China.—Very floriferous and handsome. The name has been misspelled *S. lobocarpa*. Var. **rósea,** Rehd. & Wilson. Lfts. whitish tomentose beneath while young, later villous along the midrib beneath only: fls. pink, ½in. long. Cent. China.

S. élegans, Zabel. Intermediate between and supposed to be a hybrid of S. pinnata and S. colchica: lfts. usually 5: panicles very

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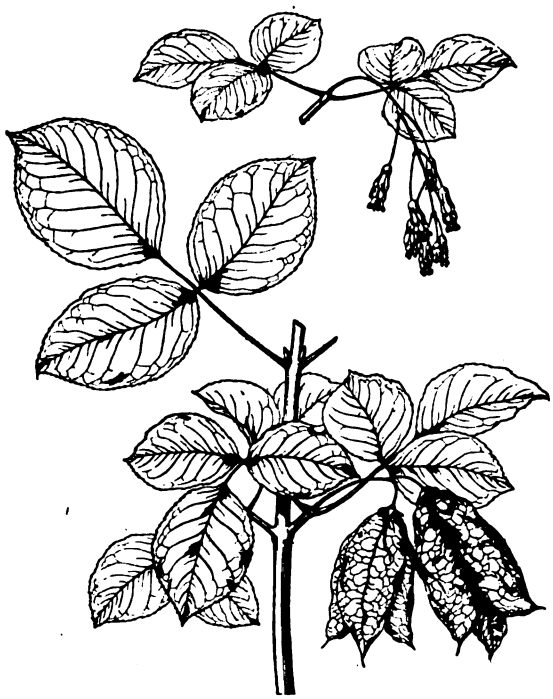
large and nodding. A very free-flowering variety with pinkish tinged fls. is var. *Hésseï*, Zabel.—*S. emòdi*, Wall. Shrub or small tree: lfts. 3, oval to oblong, 2–6 in. long; stalk of terminal lft. about 1 in. long: fls. in peduncled, pendulous, raceme-like panicles: fr. 2–3 in. long. Himalayas.

ALFRED REHDER.

STAR-APPLE: *Chrysophyllum.* **Starfish Flower:** *Stapelia Asterias.* **S. Flower:** *Aster, Trientalis, Tricleïa* and other plants. **S. Grass:** *Chloris truncata.* **Star of Bethlehem:** *Ornithogalum umbellatum.* **S. Thistle:** *Centaurea.* **S. Tulip:** *Calochortus.* **Starwort:** *Aster.*

STÁTICE (Greek name meaning *astringent*, given by Pliny to some herb). Syn., *Armèria*, Auth., not Linn. (see Vol. I, p. 395). *Plumbaginàceæ.* SEA-PINK. THRIFT. Interesting hardy border perennials, biennials, and annuals useful for both the many-flowered bright inflorescence and the stiff more or less evergreen foliage; flowers blue, lilac, white, yellow.

The genus Statice as defined by Linnæus, "Genera Plantarum," ed. 5 (1754), is based on Statice, Tourn., and Limonium, Tourn.: Statice of Tournefort is the Armeria of later authors, while Limonium of Tournefort is the Statice of later authors and of Linnæus in part. Consequently, in dividing the Linnæan genus we



3681. Staphylea Bolanderi. (×⅓)

must retain the name for that part of it which represents the origin of the name, which is exactly what Miller did in "The Gardener's Dictionary," ed. 8 (1768), retaining the name Statice for those species with a globular head and reëstablishing Limonium as the generic name of those species with an open inflorescence. This treatment is accepted by most recent authorities although it is not followed by Pax in Engler & Prantl's "Natürlichen Pflanzenfamilien."

Although the individual flowers are small, some of the sea-pinks are very showy because of the great numbers of clustered blossoms and the brilliant colors. The flowers are often scarious and may be treated as everlastings. The evergreen or semi-evergreen character of the tufted foliage also adds much interest. The plants are easy to grow, remaining for some years when well established, rooting deep. Usually grown from seed.

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KEY TO THE SPECIES OF STATICE.

A. *Calyx produced into a spur.*
  B. *Bracts between the fls. small, scarcely exceeding the fruiting pedicels*..... 1. **fasciculata**
  BB. *Bracts between the fls. about equaling the calices in the interior of heads.*
    C. *Lvs. linear*..... 2. **Welwitschii**
    CC. *Lvs. oblong-ovate*..... 3. **mauritanica**
AA. *Calyx not produced into a spur.*
  B. *Tube of calyx usually pilose all over.*
    C. *Inner lvs. of rosette not like the outer*..... 7. **juncea**
    CC. *Inner lvs. of rosette like the outer.*
      D. *Pedicel as long as the calyx-tube.* 4. **Armeria**
      DD. *Pedicel about half as long as the calyx-tube.*
        E. *Apex of lvs. rather acute*..... 5. **labradorica**
        EE. *Apex of lvs. obtuse*..... 6. **sibirica**
  BB. *Tube of calyx glabrous or pilose only on the ridges.*
    C. *Spikelets stipitate inside the involucre*..... 15. **leucocephala**
    CC. *Spikelets sessile inside the involucre.*
      D. *Exterior lvs. of the rosette differing from the others.*
        E. *Involucre pale brown*..... 13. **majellensis**
        EE. *Involucre white, showy*..... 14. **undulata**
      DD. *Exterior lvs. of the rosette the same as the others.*
        E. *Lvs. oblong-lanceolate or broader*..... 12. **pseudo-**
        EE. *Lvs. linear-lanceolate or narrower.* **[armeria**
          F. *The lvs. 3-cornered in cross-section*..... 8. **cæspitosa**
          FF. *The lvs. flat.*
            G. *Blades 3–7-nerved*..... 11. **plantaginea**
            GG. *Blades 1-, occasionally obscurely 3-nerved in No. 9.*
              H. *Involucre pale brown.* 9. **montana**
              HH. *Involucre green*..... 10. **purpurea**

For descriptions of the following species and varieties of Statice, see *Armeria* (Vol. I).

3. **S. mauritánica,** Hubb. (*Armèria mauritánica*, Wallr. *A. cephalòtes*, Hook., not Schousb.).

4. **S. Armèria,** Linn. (*Armèria marítima*, Willd. *A. vulgàris*, Willd.). Var. **álba,** Hubb. (*Armèria vulgàris* var. *álba*, Hort.) Var. **grandiflòra,** Hubb. (*Armèria vulgàris* var. *grandiflòra*, Hort. ex Bailey). Var. **Laucheàna,** Hubb. (*Armèria vulgàris* var. *Laucheàna*, Bailey. *A. Laucheàna*, Hort.). Var. **purpùrea,** Hubb. (*Armèria vulgàris* var. *purpùrea*, Hort. ex Bailey). Possibly a synonym of *S. purpurea*, so considered by some authors. Var. **rùbra,** Hubb. (*Armèria vulgàris* var. *rùbra*, Hort. ex Bailey). Var. **splèndens,** Hubb. (*Armèria vulgàris* var. *splèndens*, Hort. ex Bailey). Possibly the same as var. *Laucheana*.

6. **S. sibírica,** Ledeb. (*Armèria sibírica*, Turcz.).

7. **S. júncea,** Hubb. (*Armèria júncea*, Girard).

9. **S. montàna,** Mill. (*Armèria alpìna*, Willd.).

10. **S. purpùrea,** Koch (*Armèria purpùrea*, Koch).

11. **S. plantagínea,** All. (*Armèria plantagínea*, Willd.). Var. **leucántha,** Hubb. (*Armèria plantagínea* var. *leucántha*, Boiss.).

12. **S. pseudoarmèria,** Murr. (*Armèria latifòlia*, Willd., not *S. latifòlia*, Smith. *A. cephalòtes*, Link &

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Hoffm., not Hook.). The name pseudoarmeria has also been used for two other species, but the Murray definition applies to this species and his is the oldest use of the name.

14. **S. undulàta,** Bory & Chaub. (*Armèria undulàta,* Boiss. *A. argyrocéphala,* Wallr.).

The following species and varieties, all of which are in the trade, are not included under Armeria in Vol. I. According to Otto Kuntze and others there is but one species of Statice, *S. Armeria,* all the others being variants of this polymorphic species. The great confusion in synonymy seems to uphold this view to some extent and it is certainly questionable whether the varieties of *S. Armeria, S. plantaginea,* and *S. pseudoarmeria* are all of them distinct.

1. **S. fasciculàta,** Vent. (*Armèria fasciculàta,* Willd.). Glabrous, subshrubby at base: lvs. glaucescent, linear, canaliculate, thick, stiff and pointed: involucral lvs. in several rows, fuscous, triangular-ovate, the inner ones white-margined: fls. pale pink. Spain, Corsica, and Sardinia.—The lvs. are somewhat yucca-like.

2. **S. Wélwitschii,** Hubb. (*Armèria Wélwitschii,* Boiss.). Base subshrubby, glabrous: lvs. glaucescent, linear, somewhat channeled, obscurely 1-nerved beneath, acuminate; involucral lvs. fuscous, white-margined, lowest triangular. Portugal.

4. **S. Armèria** var. **variegàta,** Hubb. (*Armèria marítima* var. *variegàta,* Hort.), forms prostrate masses of bright golden foliage and has heads of rose fls.

5. **S. labradórica,** Hubb. & Blake (*Armèria labradórica,* Wallr.). Lvs. glabrous, linear, flat, 1-nerved, rather acute: scapes 1 or 2, low, pubescent; involucral scales herbaceous on the back, the outer ovate, the inner broadly membranaceous-margined. Labrador and Greenland.

8. **S. cæspitòsa,** Ort., not Poir. (*Armèria cæspitòsa,* Boiss. *A. bélla,* Hort., not Alboff. *A. cæspitòsa* var. *vèra,* Hort.). Forming dense cushions: lvs. very short, narrowly linear, triquetrous, short, white-mucronate: scape pubescent; involucral lvs. brownish: fls. in small heads, blush-pink or pale lilac. Mountains of Spain and Portugal. B.M. 7596.—*S. cæspitòsa,* Poir., equals *S. Armeria;* probably at least some of the material grown as *S. cæspitosa* is that species.

9. **S. montàna** var. **álba,** Hubb. (*Armèria alpìna* var. *álba,* Hort.), is a white-fld. form.

11. **S. plantagínea** var. **álba,** Hubb. (*Armèria plantagínea* var. *álba,* Hort.), has large heads of white fls., 1 ft. high. Var. **gigantèa,** Hubb. (*Armèria plantagínea* var. *gigantèa,* Hort.), grows 3 ft. high, has rigid sts., and large heads of glistening pink fls. Var. **grandiflòra,** Hubb. (*Armèria plantagínea* var. *grandiflòra,* Hort.), grows 1 ft. high, and has large crimson fls. Var. **ròsea,** Hubb. (*Armèria plantagínea* var. *ròsea,* Hort.), grows 1 ft. high and has pink fls. Var. **rùbra,** Hubb. (*Armèria plantagínea* var. *rùbra,* Hort.), grows 1 ft. high and has red fls. Var. **spléndens,** Hubb. (*Armèria plantagínea* var. *spléndens,* Hort.), grows 1–1½ ft. high and has brilliant rose-colored earlier fls. May, June.

12. **S. pseudoarmèria** var. **álba,** Hubb. (*Armèria cephalótes* var. *álba,* Hort.), has white fls. Var. **grandiflòra,** Hubb. (*Armèria cephalótes* var. *grandiflòra,* Hort.), grows 1½ ft. high and has large heads of rose-colored fls. Var. **rùbra,** Hubb. (*Armèria cephalótes* var. *rùbra,* Hort.), has rosy red fls. Var. **spléndens,** Hubb. (*Armèria cephalótes* var. *spléndens,* Hort.), grows about 18 in. high, forming large tufts of foliage and has large heads of vivid rose fls.

13. **S. majellénsis,** Hubb. (*Armèria majellénsis,* Boiss.). Cespitose, glabrous, base hardened: sheaths persistent, spreading squarrose: lvs. spreading to somewhat recurved, short, stiff, rather broad-linear, margin cartilaginous, folded to channeled, obtuse, 3-nerved: scapes medium height; heads large; involucre few-rowed, pale. Italy.

15. **S. leucocéphala,** Hubb. (*Armèria leucocéphala,* Salzm. ex Koch). Cespitose, base hardened: sheaths withering: lvs. linear, flat, 1-nerved, margin narrowly excurrent, apex short-mucronate: scape slender, more or less tall: involucre few-lvd., lvs. much shorter than the head: fls. white or rose. Corsica.

Armèria arbòrea, Hort., is described in the trade as having thick, woody, much-branched sts., each terminating with tufts of grass-like foliage and reddish fls.; unknown botanically.—*A. bracteàta,* Hort., is described as a plant about 6 in. high, with bright crimson fls., flowering May–July; possibly equals Acantholimon bracteatum, Boiss., which is a cespitose plant, with a compressed, head-like spike, with large ovate-orbicular bracts. Var. *rùbra,* Hort., has bright crimson bracts 1–2 in. long.—*A. formòsa* var. *álba,* Hort., probably equals S. pseudoarmeria var. alba. Var. *hýbrida,* Hort., is not recognisable from the data at hand.—*A. leucophýlla,* Hort., is described as growing 9 in. high and having pale primrose fls.; not known botanically.—*A. magellánica,* Hort., is described as a pretty alpine species with bright rosy crimson fls.

LIMÒNIUM (Greek, *meadow* or *marsh,* referring to the place of growth of many species). Syn., *Statice* of most authors, not of Linn.; *Goniolimon. Plumbaginàceæ.* SEA LAVENDER. Mostly perennial herbs, rarely annual or subshrubby, useful for cut-flowers and for the rock-garden.

Leaves usually radical and tufted especially, in the herbaceous species, generally rather long, alternate along the st. in the shrubby species, linear, spatulate oblong or obovate, sometimes pinnatifid or dissected: fls. blue, lavender, white, red, or yellow, in little- or much-branched panicles, borne on a leafless peduncle or scape; bracts subtending the fl.-clusters scale-like, somewhat clasping, usually coriaceous on the back, and with membranous margins, usually with 1 or 2 fls. in their axils, sometimes with dense few- to several-fld. spikelets; calyx funnel-shaped, often colored, usually the showy part of the fl., and scarious or persistent.—About 180 species well scattered about the world, but mainly seacoast plants of the northern hemisphere and especially numerous in Asia. Limoniums are of easy cult. but prefer a rather deep, loose soil. From the delicate nature of the fl.-panicles the species are better suited to rockwork and isolated positions than for mixing in a crowded border. Many of the species are useful for cut bloom, especially for mixing with other flowers. Some of the species are adapted to greenhouse culture, especially the shrubby forms.

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KEY TO THE SUBGENERA AND SECTIONS OF LIMONIUM.

A. *Stigmas capitate.* Subgenus I. GONIOLIMON. Species 1–5.
AA. *Stigmas cylindrical-filiform.*
B. *Petals united in a tube, undivided.*
Subgenus III. SIPHONANTHA. Species 30–32.
C. *Duration perennial.*
Section 1. EUSIPHONANTHA. Species 30.
CC. *Duration annual or biennial.*
Section 2. PSYLLIOSTACHYS. Species 31, 32.
BB. *Petals only united at the very base, if at all, undivided.*
Subgenus II. VERALIMONIUM. Species 6–29.
C. *Corolla yellow or yellowish white (Section 3 contains a few species with rose fls., but none of them occurs in the trade-lists and are probably not in cult.).*
D. *Limb of calyx strongly folded: scape and branches of infl. usually winged or 2-edged-flattened (not winged in Nos. 14, 15, and 16; scape terete at base in No. 7).* Section 1. PTEROCLADOS. Species 6–16.
DD. *Limb of calyx lobed or erose: scape and branches of infl. angled above; branchlets often articulate.*
Section 3. PLATYMENIUM. Species 18, 19.
CC. *Corolla rose to purple.*
D. *Scapes and branches of infl. crisped-winged or acute-angled.* Section 2. CTENOSTACHYS. Species 17.
DD. *Scapes and branches of infl. terete, the branchlets sometimes angled.*

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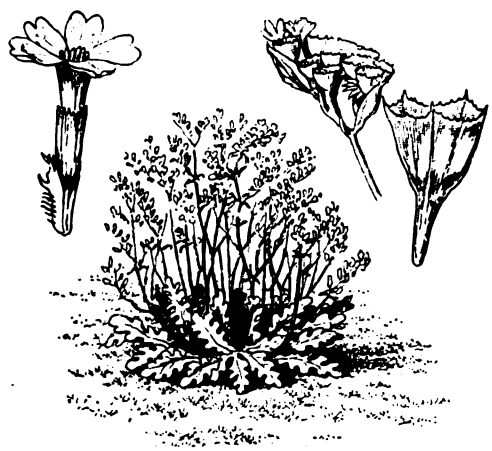
E. *Stigmas not coiled.*
Section 4. EULIMONIUM. Species 20–28.
EE. *Stigmas coiled: calyx indurated.*
Section 5. CIRCINARIA. Species 29.

Subgenus I. GONIOLIMON.

A. *Interior bracts undivided* ..... 5. **elatum**
AA. *Interior bracts 2–3-cuspidate at the apex.*
B. *Spikelets 1–2-fld.*
C. *Branches of the panicle recurved* ..... 1. **tataricum**
CC. *Branches of the panicle incurved* ..... 2. **collinum**
BB. *Spikelets 3–4-fld.*
C. *Panicle-branches narrowly 2-edged or winged, 3-angled* ..... 3. **speciosum**
CC. *Panicle-branches terete and pubescent.* .. 4. **eximium**

1. **tatáricum,** Mill. (*Státice tatárica,* Linn. *Goniolimon tatáricum,* Boiss.). Perennial, glaucescent, about 1 ft. high: lvs. 4–6 in. long, obovate or oblong-lanceolate, very narrowly marginate, abruptly or attenuately mucronate, narrowed to the petiole: scape corymbose-panicled slightly above the base; branches elongate, spreading-recurved, narrowly 3-winged; spikelets 1–2-fld., distichously arranged in rather dense terminal spikes: calyx white, green-nerved, tube short-puberulent inside and out, lobes oblong, obtuse, corolla ruby-red. June, July. S. Eu., Caucasus, Russia, and Siberia. B.M. 6537. Var. **angustifólium,** Hubb. (*Státice tatárica* var. *angustifólia,* Hort. *S. Besseriàna,* Schult. *S. incàna,* Bieb., not Linn. *S. incàna* var. *hýbrida,* Hort.), has, lanceolate, narrower lvs., often 1-fld. spikelets, and glabrescent calyx-tube. Var. **coccíneum,** Hubb. (*Goniolimon tatáricum* var. *angustifólium,* Boiss. *Státice incàna* var. *coccínea,* Hort.), grows 9 in. high and has red and white fls. Var. **nànum,** Hubb. (*Státice tatárica* var. *nàna,* Hort. *S. incàna* var. *nàna,* Hort. *S. incàna* var. *hýbrida nàna,* Hort.), is a dwarf strain of the species.



3682. Limonium (Statice) Bonduellii. The flowers are about ½ inch across.

2. **collínum,** Hubb. (*Státice collína,* Griseb. *S. Besseriàna,* Friv., not Schult. *Goniolimon collínum,* Boiss.). Perennial, glaucescent: lvs. oblong-lanceolate or lanceolate, aristate-mucronate, narrowed to the petiole: scape corymbose-panicled a little above the base; branches 3-angled, spreading-incurved; spikelets 1-fld., clustered in numerous short, straight, fasciculate spikes: fls. rose; calyx-tube glabrous, lobes oblong, obtuse. S. E. Eu., Asia Minor, and Syria.

3. **speciósum,** Kuntze (*Státice speciósa,* Linn. *Goniolimon speciósum,* Boiss.). Perennial, glaucescent, about 1 ft. high: lvs. suborbicular or oblong-obovate, abruptly attenuate-cuspidate, shortly narrowed at base: scape densely corymbose above; branches narrowly 2-edged or winged, 3-angled; spikelets 3–4-fld., distichously and densely imbricated in short scorpioid-capitate spikes: calyx white, tube densely appressed-pubescent; corolla rose or purplish pink, very deciduous. July. S. Russia, Caucasus. B.M. 656. L.B.C. 14:1336.

4. **exímium,** Kuntze (*Státice exímia,* Schrenk. *Goniolimon exímium,* Boiss.). Perennial, glaucescent, 1–2 ft. high: lvs. oblong or obovate, short-mucronate, narrowly and crisped marginate, long-attenuate to the petiole: scape tall, panicled above; branches terete and pubescent; spikelets about 4-fld., densely imbricated in densely scorpioid-capitate spikes: fls. lilac-rose; calyx green, tube appressed-pubescent, lobes white-tipped, rather acute, crenulate. Aug. Cent. Asia. B.R. 33:2. Var. **álbum,** Hubb. (*Státice exímia* var. *álba,* Hort. *S. exímia flòre-álbo,* Hort.), has large white fls. Var. **supérbum,** Hubb. (*Státice exímia* var. *supérba,* Hort.), has large spreading heads of lilac fls. Aug., Sept.

5. **elàtum,** Kuntze (*Státice elàta,* Fisch. *S. scopària,* Hort. Vilm., not Pall. *Goniolimon elàtum,* Boiss.). Perennial, green, about 2 ft. high: lvs. obovate, very obtuse, apex often retuse, shortly mucronate, rather long-attenuate to the petiole: scape tall, elongate-panicled above; branches hairy, 3-angled, spreading-incurved; spikelets 2-fld., loosely imbricated in distichous ovate spikes: fls. blue or violet-blue; calyx-tube appressed, pubescent, lobes rather acute, July, Aug. S. Russia and Siberia.

Subgenus II. VERILIMONIUM.

Section 1. PTEROCLADOS.

A. *Interior bracts 2–3-cuspidate at the apex: wings of the scape produced below the branches into lf.-like linear or lanceolate appendages.*
B. *Calyx-limb undivided.*
C. *Limb of calyx blue or purple* ..... 6. **sinuatum**
CC. *Limb of calyx yellow* ..... 7. **Bonduellii**
BB. *Calyx-limb deeply 10-lobed* ..... 8. **Thouinii**
AA. *Interior bracts undivided, truncate: wings of the scape, when present, interrupted below the branches and produced into rotundate auricles: calyx-limb blue, large, erose-truncate.*
B. *Floral branchlets not winged.*
C. *Lvs. ½–¾ in. long* ..... 14. **puberulum**
CC. *Lvs. much longer.*
D. *Blades rotundate-triangular, nearly as broad as long, about 2½ in. long* ... 15. **Preauxii**
DD. *Blades broad-triangular or rhomboid-ovoid, longer than broad, about 5–6 in. long* ..... 16. **Perezii**
BB. *Floral branchlets winged.*
C. *Inner bracts keeled, keel broadened vertically at the top.*
D. *Lvs. about 4–6 in. long: auricles of the wings below the spikes triangular-falcate* ..... 9. **arborescens**
DD. *Lvs. about 1½–2 in. long: auricles of the wings below the spikes rotundate.* .10. **fruticans**
CC. *Inner bracts dorsally convex, with a membranaceous colored limb at the truncate apex.*
D. *The lvs. entire, obovate-spatulate* ..... 11. **macrophyllum**
DD. *The lvs. lyrate or lyrate-runcinate.*
E. *Spikelets 2-fld.: calyx-tube glabrous, limb very obtusely 5-denticulate-sinuate* ..... 12. **brassicæfolium**
EE. *Spikelets 3–4-fld.: calyx-tube somewhat hirsute, limb truncate-crenulate* ..... 13. **imbricatum**

Subsection ODONTOLEPIDEÆ.

6. **sinuàtum,** Mill. (*Státice sinuàta,* Linn.). Perennial or biennial, 1–2 ft. high, the whole plant hispid-scabrous, the hairs from tubercles: lvs. pinnatifid-lyrate, sinuses and lobes rounded, the terminal bearing a bristle: scape dichotomously paniculate-corymbose, 3–5-crimped-winged, the wings below the forks produced into 3 acute, linear-lanceolate appendages; branches 3-winged, the wings gradually broadening from the base; spikelets 3–5-fld., in short secund spikes: calyx blue or bluish, tube glabrous, limb truncate, crenulate; corolla yellowish white. Aug. Medit. region. B.M. 71. G.W. 7, p. 229.—Usually treated as an annual. Var. **candidíssimum,** Hubb. (*Státice sinuàta* var. *candidíssima,* Hort.), has pure white fls.—A good plant for edging. The material known in the trade as *Státice sinuàta hýbrida* are hybrid forms of this species.

7. **Bonduèllii,** Kuntze (*Státice Bonduèlli,* Lest.; also misspelled *Bonducellii*). Fig. 3682. Annual or biennial about 1 ft. or more high: lvs. radical, spreading, 3–5 in. long, spatulate, sinuate-lyrate, hairy and ciliate, terminated, by a subulate point, tapering below into a short winged petiole, lobes oval or rounded, sinuses obtuse, terminal lobe largest, subrhomboid: scapes several, dichotomously branched, rounded and hairy at base; branches triangular, wings narrow, sometimes broad, running out below the forks into 2 or 3 linear appendages; branchlets 2-edged or 3-winged, dilated upward, forked at the apex, slightly hairy; spikelets 1–3-fld.; bracts with hard green spines, some subulate others semi-hastate: calyx yellow, tube glabrous, limb campanulate, 5-toothed, minutely crenulate; corolla deeper yellow. June–Oct. Algeria. B.M. 5158. F.S. 20:2129. H.F. II. 2:230.—The Calif. material seems to have more broadly winged branches and branchlets than usual.

8. **Thouínii,** Kuntze (*Státice Thouínii,* Viv. *S. ægyptiaca,* Pers.). Annual, glaucescent, about 1½ ft. high: lvs. sinuate or pinnatifid-lyrate, lobes and sinuses rounded, margin short-ciliate: scapes corymbose above, more or less broadly 3-winged, wings produced below the upper forks into 1–3 triangular-lanceolate rather obtuse appendages; branches strongly dilated from the base upward, running out into acute triangular appendages below the spikes; spikelets 2–3-fld., distichous in short secund spikes: calyx white, tube glabrous, lobes 5, triangular-lanceolate acute; corolla yellow. May. Teneriffe and Medit. region. B.M. 2363.

Subsection NOBILES.

9. **arboréscens,** Kuntze (*Státice arboréscens,* Brouss.). Shrub about 2 ft. high: sts. terete, naked, branched only above: lvs. broad ovate-oblong, petioled, obtuse, mucronate, base attenuate, leathery: scape tall, branched above, broadly and subcorymbosely panicled, with the branches narrowly winged; branchlets very short, 3-winged, the wings narrowly dilated from the base upward and running out into 3 triangular-falcate acute appendages below the spike; spikelets 2-fld., laxly imbricated in fascicled short, secund spikes: calyx blue, tube glabrous, limb erose-denticulate; corolla yellow. July. Teneriffe. B.M. 3776. P.M. 4:217 (under the name *Statice arborea*).

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10. **frùticans,** Kuntze (*Státice frùticans*, Webb. *S. arbòrea*, Brouss. *S. frutéscens*, Lem.). Shrub: st. short, naked, terete: lvs. at the base of the scape, leathery, ovate, obtuse, mucronate, shortly attenuate to the petiole: scape low, corymbose-paniculed above, it and the branches puberulent, strongly compressed; branchlets 2-winged, wings at base very narrow, broadened upward, running out into short, unequal rotundate auricles below the spike; spikelets 1–2-fld., very few, imbricated in very short, secund spikes: calyx blue, tube glabrous, limb acutely erose-dentate; corolla yellow. Summer. Teneriffe. F.S. 4:325. H.U. 6, p. 164.—Closely allied to *S. arborescens* from which it differs in the 3 times smaller lvs. which are 1½–2 in. long, the scapes 4–6 in., 2-edged, not winged and the auricles of the branchlets rotundate.

11. **macrophýllum,** Kuntze (*Státice macrophýlla*, Brouss. *S. Hálfordii*, Hort.; also spelled *Hólfordii*.). Subshrub about 2 ft. high: lvs. rather glabrous, very large, sessile, obovate-spatulate, very obtuse, lower part long-attenuate, obsoletely sinuate: scape tall, amply and very much branched, corymbose-paniculed above, it and the branches winged; branchlets 3-winged, wings dilated from the base upward, puberulent, net-veined, running out into short obtuse auricles below the spikelets or these may be nearly obsolete; spikelets 2-fld., grouped in 2's, erect at the ends of the branches: calyx blue, tube puberulent, limb very obtuse, 5-crenate-sinuate; corolla yellow or almost white. May. Teneriffe. B.M. 4125. B.R. 31:7.—Cult. in S. Calif. Makes a good pot-plant for winter-flowering in a cool greenhouse. T. D. Hatfield, in G. F. 9:496, says: "Old plants are somewhat subject to stem-rot. Plants should be grown in rather undersized pots, in a light soil with which some charcoal has been incorporated, and given perfect drainage, as excessive moisture at the roots is fatal. Propagation is effected by cuttings of the side shoots placed in a cool propagating-bed, or better by layering, which is well accomplished in summer by making a notch in each of the side branches and then burying the plant in ordinary garden soil below the incisions."

12. **brassicæfòlium,** Kuntze (*Státice brassicæfòlia*, Brouss.). Fig. 3683. Subshrub, 1½ ft. high: lvs. slightly short-velvety, margin somewhat ciliate, petioled, lyrate, terminal lobe largest, ovate-rotund, often irregularly lobed, very obtusely cuspidate, base subcordate; lateral lobes 2–4, ear-shaped, small, alternate, the bases often confluent: scape angled, paniculate-corymbose above; branches 2-winged, the wings very broad, coarsely undulate-lobate, running out into large auricles below the forks; branchlets 3-winged, wings dilated from the base upward running out into short, falcate auricles, glabrous; spikelets 2-fld., 2–3-fascicled at the ends of the branches: calyx purple, tube glabrous, limb very obtusely 5-denticulate-sinuate; corolla yellowish white. Aug. Canary Isls. B.M. 5162.

13. **imbricàtum,** Hubb. (*Státice imbricàta*, Webb). Subshrub, about 1½ ft. high, the whole plant shortly soft-tomentellous: lvs. lanceolate in outline, lyrate-runcinate, lobes on both sides 8–9, the upper larger, rotundate, setose-mucronate, 9–10 in. long, the lower lobes remote and retrorse: scape tall, large, corymbose above; branches undulately and broadly winged; branchlets 3-winged, narrowly dilated from the base, runing out into short, unequal, triangular auricles which are rather obtuse; spikelets 3–4-fld., few, fascicled in short spikes: calyx blue, tube somewhat hirsute, limb truncate-crenulate; corolla yellowish white. July, Aug. Teneriffe. F.S. 4:320–321.

14. **pubérulum,** Kuntze (*Státice pubérula*, Webb). Subshrub, 4–8 in. high, the whole plant white papillate-stellate or sparsely puberulous: lvs. ovate-rhomboid, rather acute, apex bearing a bristle, margin long-ciliate, short-attenuate to the equally long petiole, blade ½–¾in. long: scape low, paniculate-corymbose; branches and branchlets angled, somewhat 2-edged; spikelets 2-fld., a few distichously or laxly fascicled at the end of the branches: calyx violet, tube glabrous, limb obsoletely 5-angled, the nerves excurrent; corolla yellowish white. July. Canary Isls. B.M. 3701. B.R. 1450. H.F. II. 9:106.—**L. profùsum,** Hubb. (*L. pubérulum* × *L. macrophýllum*, the form known horticulturally as *Statice Halfordii*. *Státice profùsa*, Hort.). Subshrub, 1–2 ft. high: lvs. radical, 6–8 in. long, oval or spatulate, wavy, leathery, shining and dark green, narrower than the parents and intermediate in size between them: fls. freely produced in well-branched, corymbose panicles; calyx blue-purple; corolla yellowish white. A greenhouse hybrid. G. 8:69. G.L. 27:77. Gn.W. 22:782.—In the greenhouse old plants will attain a height of 3½ ft. and a diam. of 5 ft.

15. **Preaùxii,** Kuntze (*Státice Preaùxii*, Webb). Subshrub, 2 ft. high, glabrous: st. terete, naked: lvs. basal, rotundate-triangular, obtuse mucronulate, about 2½ in. long and the same wide, very coriaceous, base truncate and short-attenuate to a petiole 4–5 in. long with a sheathing base: scape angled, branched; branches flattened, scarcely winged; spikelets remote, in lax, rather erect, secund, terminal spikes: calyx-tube glabrous, limb lavender, obsoletely 5-angled; corolla pale yellow. Canary Isls.—Cult. in Calif.

16. **Perèzii,** Hubb. (*Státice Perèzii*, Stapf). Subshrub, less than 2 ft. high: lvs. long-petioled, broadly triangular or rhomboid-ovate, base usually truncate, but short triangular decurrent on the petiole: branches of infl. pubescent; bracts at the base of the branches sulcate-caudate, ciliate: calyx purplish blue, pubescent; corolla pale yellow. Canary Isls.—Cult. in Calif., where it is said to grow 3 ft. high.

Section 2. CTENOSTACHYS.

17. **pectinàtum,** Kuntze (*Státice pectinàta*, Ait.). Subshrub, glabrous, calcareous-punctate: lvs. in a rosette at the base of the scape or fascicled or solitary at the axils of the scales of the scape, obovate, obtuse or retuse mucronate, attenuate to the petiole: scape erect or decumbent, alternately branched, it and the branches very narrowly 3-angled to winged; spikelets 3-fld. distichously dense-imbricated, in oblong, scorpioid-spreading spikes: calyx lavender, slightly pilose at base of the ribs and limb which is obtusely 5-angled; corolla rose. Sept. Canary Isls. B.R. 26:65.

Section 3. PLATHYMENIUM.

A. *Lvs. obovate-lanceolate: spikelets 2-fld.* .....18. **sinense**
AA. *Lvs. oblong-spatulate: spikelets 4–5-fld.* .....19. **australe**

Subsection CHRYSANTHÆ.

18. **sinénse,** Kuntze (*Státice sinénsis*, Girard. *S. Fórtunei*, Lindl.). Perennial, about 1 ft. high, glabrous: lvs. obovate-lanceolate, obtuse, long-attenuate to the petiole: scape tall, dichotomously branched a little above the base, corymbose-fastigiate, it and the branches smooth, acutely angled, often 2-edged; spikelets 2-fld., rather densely imbricated, in short, somewhat secund, terminal, ovate-scorpioid spikes: calyx white or pale yellow, tube pilose only on the ribs, limb 5-angled and folded; corolla yellow. April. China. B.R. 31:63. F.S. 2:92.

19. **austràle,** Kuntze (*Státice austrális*, Spreng.). Perennial, about 1 ft. high, glabrous: lvs. oblong-spatulate, muticous, long-attenuate to the petiole, 1-nerved: scape acutely angled to sulcate, branched a little above the base; branches elongated, strict, subcorymbose-paniculed; spikelets 4–5-fld., in straight terminal spikes or secund and scorpioid, lower remote: calyx whitish, tube very smooth, limb 5-lobed, lobes ovate, mucronulate; corolla yellow. April. China, Japan, and Austral.

3683. **Limonium** (Statice) **brassicæfolium.** (×⅓)

Section 4. EULIMONIUM.

A. *Calyx-limb somewhat 10-lobed, by reason of the minute teeth between the large lobes.*
B. *Blades broadly ovate or obovate* .....22. **Gmelinii**
BB. *Blades oblong-lanceolate.*
C. *Lvs. glabrous: calyx white or bluish, tube more or less pilose on the ribs* .....20. **vulgare**
CC. *Lvs. tomentellous: calyx-tube reddish velvety* .....21. **tomentellum**
AA. *Calyx-limb 5-lobed.*
B. *Plant 1 ft. or more high.*
C. *The lvs. obovate-lanceolate, canaliculate-concave, acuminate* .....23. **lychnidifolium**
CC. *The lvs. oblong-elliptical, obtuse* .....27. **latifolium**
BB. *Plant 3–10 in. high.*
C. *Apex of lf. acute or rather so* .....24. **binervosum**
CC. *Apex of lf. obtuse.*
D. *Tube of calyx slightly puberulent* ....26. **minutum**
DD. *Tube of calyx appressed-hirsute or ciliate on the angles.*
E. *Limb of calyx reddish below, whitish above* .....25. **Gougetianum**
EE. *Limb of calyx pure white* .....28. **reticulatum**

Subsection GENUINÆ.

20. **vulgàre,** Mill. (*Státice Limònium*, Linn. *S. maritima*, Lam. in part.). Fig. 3684. Perennial, 6–12 in. or more high, glabrous: lvs. oblong-lanceolate, 1-nerved, obtuse, with an incurved mucron from or below the apex, attenuate to a rather long petiole at the base: scape tall, nearly terete, paniculate-corymbose above; spikelets 1–3-fld., distichously and densely congested in secund, more or less

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spreading or spreading recurved spikes: calyx white to bluish, tube more or less pilose on the ribs, lobes triangular, rather acute; corolla bluish lilac. Aug. to Oct. Eu., N. Afr., Asia Minor, and Syria. Var. **álbum**, Hubb. (*Státice Limónium* var. *álba*, Hort.), has a white calyx, height 1 ft. July–Sept. Var. **macrocládum**, Hubb. (*Státice Limónium* var. *macrocláda*, Boiss.), is often glaucescent, panicles very much branched, branches elongate, very spreading, spikes laxly or densely scorpioid. Medit. region and Syria.

21. **tomentéllum**, Kuntze (*Státice tomentélla*, Boiss. *S. sareptána*, Becker). Perennial, about 9–12 in. high: lvs. oblong-lanceolate, obtuse, short-attenuate to the petiole, 1-nerved, densely tomentellous beneath on the nerves, margin somewhat ciliate, otherwise glabrous: scape tall, terete, somewhat angled above, slightly and strictly branched, all densely short reddish tomentellous: spikelets 2–3-fld., distichously and densely aggregated in oblong, secund, scorpioid spikes: calyx-tube obconical, reddish velvety, lobes rotund, very obtuse; corolla rose. S. Russia.

22. **Gmélinii**, Kuntze (*Státice Gmélinii*, Willd.). Perennial, 1½–2 ft. high: lvs. glabrous, green, broad-ovate or obovate, 1-nerved, very obtuse, very short-petioled or subsessile: scape tall, terete below, somewhat angled above, corymbose-panicled; spikelets rather 2-fld., densely imbricated in short secund subscorpioid spikes: calyx-tube pilose on all or some of the ribs, limb small, dark purplish blue, lobes rotundate; corolla rose. July–Sept. Caucasus and Siberia.

Subsection DENSIFLORÆ.

23. **lynchnidifólium**, Kuntze (*S. lychnidifólia*, Girard. *S. Willdenówii*, Poir.). Perennial, glabrous, about 1–2 ft. high: lvs. large, coriaceous, obovate-lanceolate, canaliculate-concave, acuminate, attenuate to a short petiole which is glutinous at its base: scape tall, alternately and distichously branched above; branches erect-spreading, forming a pyramidal subsecund panicle; spikelets 3–4-fld., distichously and rather densely imbricated in secund, spreading-recurved spikes: corolla rose. S. W. Eu. and Morocco.

3684. Limonium (Statice) vulgare. (×⅓)

24. **binervósum**, C. E. Salmon (*L. occidentále*, Kuntze. *Státice binervósa*, G. E. Smith. *S. occidentális*, Lloyd. *S. auriculæfólia*, Vahl). Cespitose perennial, 6–10 in. high, glabrous: lvs. 1–4 in. long, lanceolate-spatulate, without nerves, rather acute, provided with an elongated bristle below the apiculate apex, long-attenuate to the often longer petiole: scape slender, flexuous, very much branched almost from the base, forming an oblong panicle; spikelets 2–4-fld., rather densely disposed in slender, straight or erect-spreading short spikes: calyx white; corolla bluish purple. July, Aug. Eu.

25. **Gougetiánum**, Kuntze (*Státice Gougetiána*, Girard; also misspelled *Gongetiana*). Perennial, 3–4 in. high, glabrous: lvs. densely rosulate, small, obovate or oblong-spatulate, very obtuse, margin crinkled, revolute, attenuate to the petiole, both surfaces rugulose to somewhat scabrous: scapes dwarf, regularly and subdichotomously alternate, branched almost from the base; branches short, strict, forming a short panicle; spikelets 2–3-fld., densely and distichously imbricated in spreading or erect-spreading, oblong spikes: calyx-tube short, appressed-hirsute, limb reddish below, whitish above; corolla lavender. July, Aug. Italy.—Foliage evergreen, fine for sunny nooks in the rockery.

Subsection STEIROCLADÆ.

26. **minútum**, Kuntze (*Státice minúta*, Linn.). Perennial or subshrub, about 9 in. high; glabrous, rarely puberulent, rather cespitose: lvs. rosulate, small, obovate or lanceolate-spatulate, obtuse or retuse: scapes dwarf, slender, branched from the base; branches strict, slender, lower ones sterile, upper corymbose-fastigiate; spikelets 2–3-fld., disposed in lax often fasciculate straight terminal spikes: calyx-tube slightly puberulent or glabrous, limb white, deeply 5-lobed, lobes ovate, plicate, rather obtuse; corolla reddish. July, Aug. S. France.

Subsection HYALOLEPIDEÆ.

27. **latifólium**, Kuntze (*Státice latifólia*, Smith. *S. latifólia magnífica*, Hort.). Perennial, 1–2 ft. high, soft-velvety with short stellate hairs: lvs. very large, oblong-elliptical, obtuse, long-attenuate to the petiole: scapes tall, very much branched, terete to angled, panicle large and effuse; spikelets 1-, rarely 2-fld., rather remote, forming lax, slender, secund, subrecurved spikes: calyx-tube obconical, short, glabrous or slightly hairy, limb white, 5-lobed, lobes triangular acute; corolla bluish lavender. June, July. Russia, Bulgaria, and Caucasus. G. 1:100; 28:367. Gn.M. 15:162.—Deep-rooting so that it should be given a very deep soil in a sunny position and left undisturbed. Var. **álbum**, Hubb. (*Státice latifólia* var. *álba*, Hort.), has panicles 2–2½ ft. across: fls. white. Var. **róseum**, Hubb. (*Státice latifólia* var. *rósea*, Hort.), is a form with rose-colored fls.

28. **reticulátum**, Mill. (*Státice reticuláta*, Linn. *S. bellidifólia*, Gouan. *S. áspia*, Willd.). Perennial, 4–8 in. high, glabrous, the whole plant granulate-scabrous: lvs. obovate or lanceolate-spatulate, often only ½in. long, obtuse, mucronulate or muticous, attenuate to the petiole: scapes branched from the base, lower branches sterile, capillary and many-forked, articulate, rather strict, upper branches densely floriferous, corymbose-paniculate; spikelets 2–3-fld., densely and distichously clustered in short spikes or subcapitately at the ends of the branches: calyx-tube short-conical, ciliate on the angles, limb white, lobes ovate, rather acute, denticulate; corolla pale lilac. July, Aug. Eu., Caucasus, and Siberia.

Section 5. CIRCINARIA.

29. **purpurátum**, Hubb. (*Státice purpuráta*, Linn.). Subshrub 1 ft. or more high, glabrous: sts. short, leafy: lvs. 1 in. long, ½in. broad, leathery, glaucescent, about 3-nerved, obovate, lanceolate or linear-spatulate, attenuate to a long petiole which is sheathing at the base, entire, obtuse, mucronate: scape tall, terete, smooth or scabrous, dichotomously corymbose; spikelets 1-fld., secund and distant along the branches or nearly touching: calyx-tube leathery, terete, obsoletely 10-ribbed, limb 10-lobed, purplish at the top; corolla rose. S. Afr. Var. **longifólium**, Hubb. (*Státice longifólia*, Thunb. *S. purpuráta* var. *longifólia*, Boiss.), has lvs. oblanceolate or nearly linear, up to 10 in. long, 2 lines wide, usually much smaller. S. Afr.

Subgenus III. SIPHONANTHA.

Section 1. EUSIPHONANTHA.

30. **cæsium**, Kuntze (*Státice cæsia*, Girard. *S. élegans*, Coss.). Perennial, 1–3 ft. high, the whole plant pruinose with calcareous dots, subtuberculate, bluish gray to whitish: lvs. all radical, small, obovate or retuse: scapes numerous, rather stout, very much branched from the base, lower branches sterile, upper elongated, slender, effuse and much branched, paniculate; spikelets 1-fld., very slender and erect, laxly or subdistichously arranged in few-fld., short, lax spikes: calyx-tube slender, glabrous, limb dirty white, 5-lobed, lobes ovate, obtuse; corolla rose, rather large. May, June. Spain.

Section 2. PSYLLIOSTACHYS.

A. *Calyx-tube hispid, limb slightly erose-dentate*. 31. **spicatum**
AA. *Calyx-tube somewhat glandular-pubescent, limb 5-toothed*. . . . . 32. **Suworowii**

31. **spicátum**, Kuntze (*Státice spicáta*, Willd.). Annual, about 6 in. high: lvs. soft, in outline lanceolate-oblong, pinnately parted to runcinate, lobes obtuse, triangular-oblong, alternate, confluent at base: scapes erect, surpassing the lvs., terete, slightly papillose-lanate, bearing long dense cylindrical spikes often interrupted at base or branched; spikelets 2–3-fld., densely clustered: calyx-tube hispid, limb obsoletely erose-dentate; corolla rose or white, lobes ovate. Summer. Caucasus region to Persia. G. 3:155; 11:281.

32. **Suwórowii**, Kuntze (*Státice Suwórowii*, Regel). Annual, 9–16 in. or more high: lvs. all basal, glabrous, long-lanceolate or oblanceolate, 6–8 in. long, entire or usually coarsely runcinate, the teeth or lobes triangular, acute: scapes several, stout, obtusely angled, bearing a long terminal spike and several distant, sessile lateral ones, 4–6 in. long, nearly ½in. diam.; spikelets 2–3-fld., crowded: calyx-tube somewhat glandular-pubescent, green, limb 5-toothed, rose-red; corolla tubular, rose-red, lobes ovate-rotund. June, July. W. Turkestan. B.M. 6959. Gn. 72, p. 338. Gn.W. 25:195. J.H. III. 60:149. R.B. 25:97. Gt. 31:1095. Var. **álbum**, Hubb. (*Státice Suwórowii* var. *álba*, Hort.), is a form with white fls. G.M. 56:477. Useful for cut-flowers.—**L. supérbum**, Hubb. (*L. Suworowii* × *L. leptostachyum*. *Státice supérba*, Regel.). Annual, up to 28 in. high: lvs. bright green, pinnately lobed, midnerve red: scapes 5 or more, erect, covered with fls. almost from the base, winged, the spikes forming a small densely crowded panicle: fls. rose-red. A garden hybrid. Var. **flóre-álbo**, Hubb. (*Státice superba* var. *flóre-álbo*, Benary. *S. supérba* var. *álba*, Benary), is a form with white fls.

The following species are mentioned in the trade and belong in Limonium unless otherwise stated, but cannot be placed in the key or are of minor importance.—*Státice altáica*, Hort. ex Don, is unknown botanically, but is said to grow 2½ ft. high and have purple or blue fls. July–Sept.—*Státice Bútcheri*, Hort., is offered as having blue fls.—*Státice coccínea*, Hort., is offered in the trade as a perennial.—*Státice excélsa*, Hort., is offered in the trade.—*Limónium leptostáchyum*, Kuntze (Statice leptostachya, Boiss.), is a glabrous annual: lvs. linear in outline, pinnately parted; segms. linear: calyx-tube appressed-hirsute; corolla white. Persia.—*Státice nána álba*, Hort., is offered in the trade; possibly is a form of L. tataricum.—*Státice penduliflóra*, Hort., is offered in the trade but is unknown botanically.—*Státice spatuláta*, is offered by one firm as having ornamental green lvs. and purple-and-white fls., growing 1 ft. high, flowering July to Sept. and by a second firm as growing 1½ ft. high, with very graceful sprays of blue fls. in July and Aug.—Not really possible to say with certainty what it is, perhaps L. binervosum.

F. TRACY HUBBARD.†

STAUNTÒNIA (named for Sir G. L. Staunton, physician, 1740–1801). *Lardizabalàceæ*. Scandent shrubs, hardy and evergreen, useful for ornamental purposes: lvs. digitately parted, 3–7 lfts.: fls. purple or greenish, in axillary corymb-like racemes, monœcious; sepals 6, petaloid, the outer broader; petals none; stamens 6:

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berry globose, finally splitting open.—About 10 species, China and Japan.

The stauntonias are beautiful evergreen climbers and well adapted to the soil and climate of the South Atlantic and Gulf regions. Both *S. hexaphylla* and the related *Holbœllia latifolia* (known also as *Stauntonia latifolia*) grow well in the writer's Florida garden, although they are not such very luxuriant climbers as are the allamandas, thunbergias, and bignonias. It requires a few years before they are fully established. They are excellent subjects to be planted on old stumps and on small trees, such as catalpa and mulberry trees, which they perfectly cover in the course of time with their pretty evergreen leaves and their rather insignificant but powerfully fragrant flowers. They will not flourish in dry hot sandy soil, demanding for their welfare rather moist shady spots containing a profusion of humus. A little commercial fertilizer containing a fair amount of nitrogen and potash will also prove very beneficial. The need of some kind of a stimulant is shown by the plant itself, which assumes a rather yellowish cast in the green color of the foliage. A few

3685. Stauntonia hexaphylla. (×½)

days after it has received some plant-food the foliage shows a very beautiful dark green color. These two species and the beautiful *Kadsura japonica* are valuable additions to the garden flora of the southern states. (H. Nehrling.)

hexaphýlla, Decne. Fig. 3685. A handsome vine becoming 40 ft. high: lfts. oval, about 2 in. long, stalked: fls. in axillary clusters, white, fragrant in spring: berry about 4 in. long, splashed with scarlet. Japan. A.G. 12:139. F. W. Barclay.

STAURÒPSIS (Greek, *cross* and *appearance*, alluding to the shape of the flower). Syn., *Fièldia*. *Orchidàceæ*. Epiphytic herbs with leafy stems and without pseudobulbs, grown in the warmhouse.

Leaves distichous, spreading, leathery, and flat: fls. borne on lateral peduncles in a raceme which is sometimes short, simple and rather large- and few-fld., sometimes long, lax-branched and quite numerous, small-fld.; sepals about equal, free, spreading; petals similar to the sepals; labellum affixed to the base of the column, spreading, concave, not spurred, narrow, the lateral lobes short, the midlobe rather long-concave and bent in at the tip; column short, thick, not winged and footless; pollinia 2: caps. oblong-clavate, not beaked.—About 10 species, India and China, Malaya and the Philippines. Treatment similar to vanda.

lissochiloìdes, Pfitz. (*S. Bàtemannii*, Nichols. *Fièldia lissochiloìdes*, Gaudich. *Vánda lissochiloìdes*, Lindl. *V. Bàtemannii*, Lindl.). Sts. stout, 1–5 ft. high or more: lvs. 18–24 in. long, broad, coriaceous: scapes 12–20-fld.: fls. about 3 in. across; sepals and petals yellow, densely spotted with red-purple, purplish crimson beneath; labellum 3-lobed, saccate at base, the side lobes erect, buff-yellow or purple-crimson, the midlobe boat-shaped, purple-crimson. Philippines. B.R. 32:59. J.H. III. 52:471. Described also under Vanda.

luchuénsis, Rolfe. Scandent herb with sts. 1 ft. long: lvs. oblong, very shortly 2-lobed, 4–6 in. long: scapes suberect, 6–16 in. long, bearing a many-fld. raceme: fls. showy, yellow with brown spots; sepals oblong; petals somewhat narrower; labellum fleshy, slightly 3-lobed, saccate at base. Liukiu Isls. F. Tracy Hubbard.

STAUROSTÍGMA (Greek, *cross* and *stigma*, in allusion to the cross or star-shaped stigmas). *Aràceæ*. Tuberous stoloniferous herbs, adapted to the warmhouse: lvs. long-petioled, hastate-cordate in outline, pinnately cut or 1–2-pinnately parted, the pinnæ sessile, acute: peduncles solitary or several, as long as the lvs.; spathe erect, lanceolate, base convolute, gaping or open above; spadix cylindrical: fls. monœcious, all perfect, the male and female contiguous; perianth wanting: berries subglobose, deeply 2–5-sulcate, 2–5-celled, the cells 1-seeded.—About 7 species, Trop. Amer. The oldest name for this genus is Asterostigma. *S. concinnum*, Koch. About 1½ ft. high: young lvs. reniform, pedately cut, the segms. obovate-lanceolate, the older 3-parted, the middle part pinnately cut, elongated-oblong, the lateral parts cymosely bisected or trisected; the petioles marked with pale violet and dark purple: spathe narrow-lanceolate, very acute; spadix white and purple, the male part dense-fld.; peduncle livid purple, shorter than the petioles. Brazil. L.B.C. 16:1590 (as *Caladium luridum*). Variable. *S. Luschnathiànum*, Koch (*Asterostigma Luschnathiànum*, Schott). Lvs. 1–2 ft. long, deep green, pinnatifid, broadly ovate, the 2 lower segms. deflexed, deeply cut into 3–5 lobes, the remaining segms. 4–6 pairs, sessile, remote; the petioles 6–12 in. long, whitish with black-purple streaks: spathe deep green within and speckled with brown, reticulated externally, 2–4 in. long, erect, cylindric, acute; spadix cylindric; anthers scarlet; ovaries white; scape similar to the petiole. Brazil. B.M. 5972. *S. Riedelìànum*, Engl. About 2 ft. high: lvs., the adults, 3-parted, the middle one pinnately cut, the segms. linear-oblong, sessile, abruptly and rather long-cuspidate at the apex; the lower parts short-decurrent: peduncles spotted and variegated: spathe yellowish, greenish outside; spadix slender; peduncles many, variegated. Brazil. F. Tracy Hubbard.

STEIRONÈMA (Greek, *sterile threads*, referring to the staminodia). *Primulàceæ*. Loosestrife. Erect glabrous herbs useful for borders in damp soil.

Leaves opposite, or rarely whorled, entire: fls. rather large (6–12 lines broad), yellow, axillary, solitary or clustered: peduncles slender: corolla rotate, 5-parted; lobes erose and often cuspidate, each separately involute around its stamen; stamens 5, opposite the lobes, with 5 alternating subulate staminodia; filaments distinct, or nearly so; ovary superior, 1-celled with free central placenta, becoming capsular in fr.; seeds many; style and stigma 1. Differs from Lysimachia in the presence of the sterile stamens, and in the æstivation of the corolla.—About 5 species, N. Amer. All perennials. Offered by collectors of native plants, for colonizing, borders and wild-gardens.

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A. *Lvs. membranaceous with pinnate veins.*

ciliàtum, Raf. (*Lysimàchia ciliàta,* Linn.). St. 1–4 ft. high, sparingly branched: lvs. 2–6 in. long, ovate-oblong to ovate-lanceolate, acute or acuminate; base rounded or subcordate; petioles ½in. long, coarsely ciliate. Moist thickets, U. S.

lanceolàtum, Gray (*Lysimàchia lanceolàta,* Walt. *L. hýbrida,* Michx.). Plant 1–3 ft. high: lvs. lanceolate, 1–4 in. long, narrowed into a short margined petiole, or subsessile, the lower sometimes broader. E. U. S.

AA. *Lvs. firm, linear, usually 1-nerved.*

quadriflòrum, Hitchc. (*Lysimàchia quadriflòra,* Sims. *L. longifòlia,* Pursh. *S. longifòlium,* Gray). St. 4-angled, 1–3 ft. high: lvs. thick and firm, sessile, subacute at both ends, 1–4 in. long, smooth and shining: margins slightly revolute; basal often broader; veins obscure. E. U. S. B.M. 660. K. M. WIEGAND.

STÈLIS (an old Greek name used by Theophrastus for some parasitical plant). *Orchidàceæ.* Epiphytic herbs, some of them adapted to the warmhouse and others to the intermediate house: sts. cespitose or creeping, with simple branches 1-lvd. at the tip and frequently 1–3-sheathed below the lf., not pseudobulbous: lvs. leathery, often contracted at the base to the petiole which is frequently concave or channeled and sometimes articulate near the base: fls. small to minute, short-pedicelled in an elongated raceme at the base of the terminal lf., secund, rarely somewhat distichous; bracts alternate, various; sepals frequently subequal, broad or triangular, spreading, more or less connate; petals much shorter, broad, the margins thickened; labellum sessile at the base of the column, equal and similar to the petals or narrower and sometimes shortly 3-lobed; column equaling or shorter than the labellum; pollinia 2: caps. small, ovoid or oblong, not beaked, often 3-edged.—About 200 species, Mex. and W. Indies southward to Brazil and Peru. Treatment the same as for Pleurothallis.

S. barbàta, Rolfe, is a species differing from S. Endresii in having long-bearded sepals and a tridenticulate lip: its fls. are greenish ochre-yellow with purple hairs and red-purple blotches. Costa Rica.—*S. Bindtii,* Wildem., grows about 2 in. high: lvs. thick, 2–3 in. long, deeply channeled above: racemes 1–3, many-fld.: fls. green, not spotted; sepals membranaceous; petals concave, very short; lip hooded, about as long as the petals. Brazil.—*S. Bruchmuèlleri,* Reichb. f., has lvs. 1½–2 in. long: fls. yellowish purple outside, pale purple within, disposed at intervals along the rachis; sepals broadly ovate, acute, spreading, hairy within; petals and lip minute, the latter undivided. Mex.(?). B.M. 6521.—*S. canaliculàta,* Reichb. f., is about 8 in. high, has cuneate-oblong, obtuse, thick lvs. which are plainly channeled in the middle: fls. dull yellowish green, very small, secund in dense racemes; bracts and rachis whitish. Colombia.—*S. ciliàris,* Lindl. (S. atropurpurea, Hook.), grows about 6 in. high: lvs. broadly oblong, narrowed at base: spike naked half way then closely fld.: fls. deep purple; sepals ovate, long-fringed; petals compressed-rhomboid, fleshy; lip ovate, fleshy, channeled at base. Mex. B.M. 3975.—*S. dolichopus,* Schlechter, has sts. about 6 in. high: lvs. rather thick, oblong-ligulate, up to nearly 4 in. long: raceme only 1½–1¾ in. long: fls. pale yellow. Probably Colombia.—*S. Endrèsii,* Reichb. f., has lvs. cuneate, oblong-ligulate, obtuse, emarginate and apiculate, thick: raceme distichous: fls. greenish white; sepals coalescing toward the base; lip fleshy, transversely subrhomboid, excavated. Costa Rica.—*S. glóssula,* Reichb. f., is densely tufted: lvs. cuneate, oblong-ligulate, minutely bilobed with a small tooth at apex: fls. brownish, in 2 transverse rows; the upper sepal having a longer extent than the whole of the other floral organs together; lip fleshy, papilliform. Costa Rica.—*S. grandiflòra,* Lindl., has sts. 3 in. high: lvs. oblong, petiolate, emarginate, 4½ x 1 in.: spike dense; spathe large, acuminate: fls. chocolate-colored, large for the genus; sepals equal, obtuse; petals ovate; lip ovate, concave, emarginate. Brazil.—*S. grossilàbris,* Reichb. f. Plant tufted: lvs. cuneate, spatulate, obtuse: racemes shorter than the lvs.: fls. light greenish, small; lip thick and fleshy. Hab.(?).—*S. Hennisiàna,* Schlechter, has slender sts. up to 2½ in. long, 1-lvd.: lvs. lanceolate-ligulate, about 3 in. long, petiole 1¼ in. long: racemes slender, 1-sided, many-fld., usually slightly longer than the lvs.: fls. dark purple-red. Colombia.—*S. macroglóssa,* Hort., is offered in the trade.—*S. micrántha,* Swartz, grows 3–6 in. high: lvs. lanceolate-oblong, rather blunt, 1–2½ in. long: raceme slender, spike-like: fls. whitish, red within, nodding, 1-sided-distichous; sepals deltoid; petals and lip truncate. Jamaica. L.B.C. 11:1011.—*S. ophioglossoides,* Swartz, has the st. shorter than the lvs., which are 2½–6 in. long, oblong-linear, rather blunt, long-tapering at the base: raceme slender, 1-sided, pedunculate: fls. greenish, with a tinge of purple, minute. W. Indies. B.R. 935. L.B.C. 50:442.—*S. sesquipedàlis,* Lindl., is about 6 in. high: lvs. broadly oval, shortly petiolate, 1½–4 in. long: spike 7–10 in. long: fls. pale yellow, secund, large; sepals roundish ovate, obtuse; petals oblate; lip oblate, hooded. Venezuela.—*S. venòsa,* Hort., said to have 6 lvs., is offered in the trade.—*S. zonàta,* Reichb. f., has a short st.: lvs. very thick, cuneate-oblong, blunt: raceme 1-sided: fls. light ochre; sepals brown at base; petals with a mauve middle zone. Guiana. F. TRACY HUBBARD.

STELLÀRIA (Latin, *star,* referring to the form of the flower). *Caryophyllàceæ.* Annual or perennial herbs, mostly diffuse, tufted or weakly ascending, glabrous or pubescent, of little cultural value.

Leaves opposite, simple: fls. usually white, in terminal or axillary, naked or leafy paniculate cymes or rarely subsolitary; sepals 5, very rarely 4; petals just as many as the sepals, 2-cleft or rarely laciniate or only emarginate; stamens 10 or fewer by abortion; ovary 1-celled: caps. globose, ovoid or oblong, dehiscent by as many or twice as many teeth as there are carpels.—About 100 species, scattered all over the world but chiefly in the temperate regions.

A. *Fls. 7–10 lines across.*

Holóstea, Linn. EASTER BELL. A hardy perennial, erect, 6–18 in. high, simple or somewhat branched, from a creeping rootstock: lvs. sessile, lanceolate, 1–3 in. long: fls. white, abundant, in a terminal leafy panicle; sepals one-half or two-thirds as long as the petals. May, June. Eu., Asia. B.B. 2:22.—This and the next are desirable for dry banks where grass will not grow well and for other carpeting purposes.

3686. Stellaria media. (Flower ×3)

AA. *Fls. 2–5 lines across.*

B. *Lvs. narrow.*

gramínea, Linn. A slender-stemmed, hardy perennial plant not usually over 6 in. high, from a creeping rootstock: lvs. sessile, linear-lanceolate, usually about 1 in. long: fls. white, in terminal or lateral scarious bracted open panicles; sepals and petals nearly equal in length. May, June. Eu.; naturalized in Amer. B.B. 2:23. Var. **aùrea,** Hort., GOLDEN STITCHWORT, has pale yellow lvs. and is lower and more matted in growth. Well adapted for sandy banks where grass does not grow well.

BB. *Lvs. ovate.*

mèdia, Linn. CHICKWEED. Fig. 3686. A low, decumbent annual weed common in all rich, moist, cult. soils, especially troublesome during the cooler months of the growing season and in frames, and the like, during winter. Lvs. 2 lines to 1½ in. long, the lower petioled, the upper sessile: fls. axillary or in terminal leafy cymes; sepals longer than the petals. Eu., Asia; naturalized. B.B. 2:21.—It is considered to be a good fall and winter cover-plant in orchards and vineyards, but is never cult. It is a surface-rooting plant. F. W. BARCLAY.

STEMÒNA (Greek, stamen, alluding to the foliaceous stamens). Syn., *Roxbúrghia. Stemonàceæ;* by some the family is called *Roxburghiàceæ.* Tall climbing perennial herbs, from a tuberous fusiform root, suitable only for the warmhouse: lvs. opposite, alternate or whorled, ovate, 3–9-costate: fls. solitary, or few and subracemose; perianth-segms. 4, lanceolate, many-nerved; stamens subhypogynous, the connectives produced in very long linear-lanceolate appendages; ovary free: caps. ovoid or oblong.—About 15 species, India, China, and Malaya

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CVII. Effective shrubbery border.—Spireas in good form.

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CVII. Effective shrubbery border. - Spiræa in good form.

to Austral. *S. Cúrtisii*, Hook. f. St. twining, leafing and flowering at the same time: lvs. 4–5 in. long, alternate; the petiole very long and slender: fls. small, apparently unisexual. India. B.M. 7254. Similar to the following. *S. tuberòsa*, Lour. (*S. gloriosoìdes*, Voigt. *Roxbúrghia gloriosoìdes*, Jones. *R. gloriòsa*, Peers. *R. viridiflòra*, Smith). Tubers cylindric, 6–12 in. long: st. woody below, twining, leafing and flowering at the same time; branches terete: lvs. 4–10 in. long, broadly ovate-cordate, acuminate, membranaceous, shining: peduncle 1–2 in. long, usually 2-fld.: fls. erect, fetid; perianth spreading and revolute, segms. lanceolate, acuminate, greenish with many purplish nerves: caps. ovoid-oblong, 5–8-seeded. India and Assam. F.S. 2:86. B.M. 1500. H. U. 3, p. 353. The plants are allied to the lily family.

STENÁCTIS: *Erigeron.*

STENÁNDRIUM (Greek, *narrow anthers*). *Acanthàceæ*. Nearly stemless or short-stemmed herbs, frequently villous or pubescent, adapted to the warm- or coolhouse: lvs. often radical or clustered at the base of the st., very entire: spikes scape-like, peduncled, dense or interrupted: fls. usually small at the axils of the opposite bracts, solitary, sessile, spicate; calyx 5-parted, segms. narrow, acute; corolla-tube slender, cylindrical, limb oblique, 5-lobed, lobes obovate, retuse; stamens 4, didynamous: caps. oblong or subfusiform, subterete, 4-seeded or by abortion fewer-seeded.—About 30 species, Trop. and Subtrop. Amer.

Líndenii, N. E. Br. A low-growing compact plant, with broadly elliptical lvs. rounded at the apex and long-attenuate on the petiole, velvety in appearance, of a dark green with a feathering of white or yellow along the veins, somewhat purplish underneath: spikes 2–3 in. long, narrowly cylindrical: fls. not showy, about ¾in. long, yellow: bracts ovate, acute, serrate, green. I.H. 38:136; 40:173 (4). G.W. 3, p. 160.—Tender foliage plant. F. W. Barclay.

STENÁNTHIUM (Greek, *narrow flower;* referring to perianth-segments). *Liliàceæ*. Bulbous plants, useful both out-of-doors and in the greenhouse.

Stems erect, tall, simple except for the infl.: lvs. radical or at the base of the st. long, linear or linear-lanceolate, smaller upward along the st. or none: fls. polygamous, whitish, greenish or dark purple, sometimes in lax slightly branched racemes, sometimes very numerous and smaller in pyramidal panicles, pedicelled, frequently nodding; perianth narrowly or broadly campanulate, persistent, segms. connate at base in a very short, turbinate tube, spreading above, narrow or lanceolate, acuminate, 3–7-nerved; stamens 6; ovary ovoid, 3-celled: caps. ovoid-oblong, partially dehiscent into 3 carpels.—About 5 species; one native of Sachaline Isl., another Mexican, the others W. American.

occidentàle, Gray. St. slender, 10–20 in. high: lvs. linear-lanceolate, acuminate, 6–10 in. long: raceme simple or branched at base; pedicels slender, spreading or recurved: fls. campanulate, nodding, brownish purple; perianth-segms. 6–8 lines long, oblong to lanceolate, acuminate. Rocky banks, Ore. to Brit. Col. and Idaho.

robústum, Wats. Sts. stout, 3–5 ft. tall, usually very leafy: lvs. often 1 ft. long, lower 4–10 lines broad, upper reduced to bracts: panicle dense, usually compound, branches spreading or ascending: fls. greenish or white, 6–8 lines broad: caps. ovoid-oblong. Moist soil, Pa. and Ohio to S. C., Tenn., and Mo. B.B. (ed. 2) 1:490. Gn. 68, p. 177; 74, p. 513. G.W. 14, pp. 676, 677. F.E. 22:440. F. Tracy Hubbard.

STÈNIA (Greek, *narrow*, alluding to the form of the pollen-masses). *Orchidàceæ*. Epiphytic herbs with short sts. and clustered pseudobulbs which bear 1–2 lvs., grown occasionally in the warmhouse: lvs. oblong or narrow, leathery, midrib prominent: scapes short at the axils of the sheaths, below the lvs. or pseudobulbs, recurved, with 1 rather large fl.; sepals subequal, free among themselves, spreading, the lateral a little broader; petals similar to the dorsal sepals; labellum continuous with the foot of the column, inbent, fleshy, broad, concave, nearly saccate, the lateral lobes minute, midlobe undivided or all broader and fimbriate; column rather thick and erect; pollinia 4, oblong-linear: caps. unknown. Two species, Trop. S. Amer. Treatment much as in maxillaria. *S. guttàta*, Reichb. f., is similar to the following, but differs in having blunter sepals and petals which are straw-colored with purple spots and in the lip being blotched and having only seven callous teeth. Peru. *S. pállida*, Lindl. St. wanting: lvs. 2–5, oblong, acute, slightly narrowed and keeled at the base, sheathed with brownish spathaceous scales: scapes radical, prostrate: fls. pale citron-color, 1½ in. or more diam.; sepals and petals linear, acute; lip spotted with red, nearly saccate, entire, fleshy, ovate. Guiana. B.R. 24:20. F. Tracy Hubbard.

STENOCÁRPUS (Greek, *narrow fruit*, referring to the follicles, which are long and narrow). *Proteàceæ*. Trees, sometimes grown in the warmhouse or the greenhouse.

Leaves alternate or scattered, entire or deeply pinnatifid with few lobes: peduncles terminal or in the upper axils, sometimes several in an umbel or short raceme, each bearing an umbel of pedicellate red or yellow fls.; bracts none or falling off early: fls. hermaphrodite; perianth slightly irregular, tube opening along the lower side, limb nearly globular and recurved; segms. at length separating; anthers broad, sessile within the concave laminæ; ovary stipitate, ovules several, imbricate downward in 2 rows: follicle usually narrow, coriaceous.—About 18 species, 3 endemic to Austral., the others natives of New Caledonia.

Cúnninghamii, R. Br. Tall, bushy shrub or small tree, glabrous or the infl. slightly pubescent: lvs. about 2–4 in. long, oblong-lanceolate, obtuse or acuminate, tapering to a short petiole, faintly 3–5-nerved: ovary glabrous, fls. otherwise as in *S. salignus*. Austral.

salígnus, R. Br. Moderate-sized tree, glabrous or the infl. minutely pubescent: lvs. 2–4 in. long, in the typical form ovate-lanceolate or elliptical, acute, acuminate or rarely obtuse, tapering to a short petiole: peduncles slender, bearing an umbel of 10–20 fls., occasionally up to 30 fls.: fls. greenish white; perianth usually less than ½in. long; ovary slightly silky-pubescent or nearly glabrous. Austral. B.R. 441.—Cult. in Calif.

sinuàtus, Endl. (*S. Cúnninghamii*, Hook., not R. Br.). Tree said to grow to a height of 60–100 ft., glabrous or the infl. minutely tomentose: lvs. petioled, either undivided, oblong-lanceolate and 6–8 in. long, or pinnatifid and over 1 ft. long, with 1–4 oblong lobes on each side, mostly obtuse, quite glabrous, but reddish beneath, penninerved and minutely reticulate: peduncles terminal, either 2 or more together in a general umbel or several at some distance forming a short broad raceme, each peduncle 2–4 in. long, bearing an umbel of 12–20 bright red fls.: perianth 1 in. long; ovary densely pubescent on a glabrous stipe. Austral. B.M. 4263. F.S. 3:189. P.M. 14:1. F. Tracy Hubbard.†

STENOCHLÆNA (Greek, *narrow* and *covering*). *Polypodiàceæ*. A genus of tropical ferns with long climbing sts. and with usually 1-pinnate lvs.: fertile lvs. much reduced in tissue, and bearing the sporangia entirely covering the under sides, sometimes spreading over the margins. The general relationship of the species is with Lomaria, but owing to the way in which the sporangia are borne, they have often been referred to Acrostichum. Culturally they belong with epiphytic plants; they do best on tree fern stems and the like.

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palústris, Bedd. (*S. scándens*, J. Smith). Rootstock widely climbing: lvs. 1–3 ft. long, with pinnæ 4–8 in. long; fertile pinnæ slender, 6–12 in. long; texture leathery. India. S. 1:224.—A vigorous grower and coarse feeder, much used in cooler houses of large ferneries. It will form a mass of rootstocks several feet long if grown on a fern stem, producing a large number of the rather pale lvs.

sorbifòlium, Linn. Rootstock climbing, often prickly: lvs. 12–18 in. long, 6–12 in. wide, with close veins; fertile pinnæ 2–4 in. long, narrow. E. and W. Indies to Brazil. R. C. BENEDICT.

STENOGLÓTTIS (Greek, *narrow* and *tongue*, referring to the narrow lip). *Orchidàceæ*. Terrestrial herbs, with short sts. and tuberiferous or thickened fleshy fasciculate roots, which are suitable for the intermediate house, but not commonly cult.: lvs. radical, numerous, rosulate or tufted: fls. small, short-pedicelled, arranged in loose somewhat 1-sided racemes; bracts small; sepals free, subequal; petals somewhat narrower than the sepals and suberect; lip continuous with the base of the column, cuneate-oblong without a spur, 3–5-cleft at the apex; column very short and broad; pollinia granular: caps. oblong, erect. Three species, Trop. and S. Afr. *S. fimbriàta*, Lindl. Lvs. numerous, oblong or narrowly lanceolate-oblong, acute, bright green, usually with few or numerous blackish or purple-black blotches: scapes erect, slender, 6–12 in. high: racemes 1½–6 in. long, lax, many-fld.: fls. light purple with a few elongated dark purple blotches on the lip; sepals broadly ovate, obtuse or subacute; petals ovate, subacute; lip linear-oblong, 3-cleft or 3-parted: caps. narrowly oblong. S. Afr. B.M. 5872. *S. longifòlia*, Hook. f. Lvs. numerous, ensiform, or linear-oblong, acuminate, uniformly light green, 3–7 in. long: scapes erect, often stout, 9–21 in. high, with numerous linear-lanceolate, somewhat recurved sheaths; racemes 4–10 in. long, many-fld.: fls. light purple with a few minute darker dots on the lip, occasionally white; sepals broadly ovate, subobtuse; petals ovate, subacute; lip linear-oblong, 5-fid or 5-parted. B.M. 7186. G.C. III. 16: 563. G.W. 14, p. 653. F. TRACY HUBBARD.

STENOLÒBIUM: *Tecoma*.

STENOLÒMA (Greek, *narrow-fringed*). *Polypodiàceæ*. A generic name for a group of tropical ferns now referred to *Odontosoria*, which see.

STENOMÉSSON (Greek, *small* and *middle*, alluding to the corolla-tube, which is usually contracted near the middle). *Amaryllidàceæ*. Bulbous herbs grown in the warm- or coolhouse.

Leaves developing with the fls., linear or broadly strap-shaped: fls. in several umbels, rarely reduced to one, pedicels often recurved, making the fls. pendulous; involucral bracts 2; perianth red, golden, or tawny, tube elongated, subcylindrical, slightly contracted above the base or toward the middle, lobes erect or more or less spreading; ovary 3-celled: caps. subglobose or 3-furrowed, loculicidally 3-valved; seeds black.—About 22 species, Trop. Amer.

Stenomessons require a good soil and a sunny house with a temperature never below 45°. During the growing season they should have plenty of water, but when at rest comparative dryness is necessary. The offsets should be removed from the old bulbs before growth commences. The plants continue in bloom a number of weeks in spring and summer.

A. *Style shorter than the perianth.*

incarnàtum, Baker (*Cobúrgia incarnàta*, Sweet). A tender plant: bulb globose, 2–3 in. through: lvs. thick, glaucous, obtuse, about 1½ ft. long, strap-shaped: scape 2 ft. high: fls. 2½–3 in. long, few to many in an umbel, variable in color but typically crimson, with a green spot on each segm. Aug. Peru. I.H. 38:123 (perianth-limb light yellow). Gn. 50:62.

AA. *Style longer than the perianth.*

flàvum, Herb. A tender plant: bulb somewhat globose, 1 in. through: lvs. about 1 ft. long, oblanceolate, obscurely petioled, at first compressed on the margin: scape 1 ft. high: fls. bright yellow, 1½–2 in. long, usually few in an umbel. B.M. 2641. B.R. 778 (as *Chrysiphiala flava*). F. W. BARCLAY.

STENORHÝNCHUS (Greek for *small* and *beak*). *Orchidàceæ*. Terrestrial plants: scape arising from a rosette of lvs., bearing a raceme or spike: fls. with a distinct chin; dorsal sepal and petals forming a helmet, parallel; lip with a broad base and narrower apex, the base surrounding the column; beak narrow and long.—About 10 species, in Trop. and warm Temp. Amer.

speciòsus, Rich. (*Spirànthes coloràta*, N. E. Br. *S. cólorans*, Hemsl.). Lvs. elliptic, green: bracts acuminate, oblong-lanceolate, as long as fls.: fls. crimson. Trop. Amer. B.M. 1374 (as *Neottia speciosa*). GEORGE V. NASH.

STENOSPERMÀTION (Greek for *small* and *male element*). Sometimes written *Stenospermàtium*. *Aràceæ*. Climbing warmhouse plants: lvs. with long-sheathed petioles; blades elliptic or lanceolate, inequilateral, the primary lateral nerves numerous, ascending: peduncles rather long, at first nodding at apex, later erect: spathe convolute, at length expanding; spadix stipitate, cylindric, white: fls. perfect; stamens 4.—About 20 species, natives of the Andes of Peru and of N. Brazil.

multiovulàtum, N. E. Br. Three to 6 ft. tall: blades 12–16 in. long, 4–6 in. wide, oblong or narrowly elliptic-oblong, coriaceous, opaque green, paler beneath: peduncle 12–18 in. long: spathe 5–6 in. long; spadix 4½–6½ in. long. Colombia. GEORGE V. NASH.

STENOTÁPHRUM (Greek, *stenos*, narrow, and *taphros*, a trench, the spikelets being partially embedded in the rachis). *Gramíneæ*. Creeping grasses with compressed culms, flat divergent blades and narrow flat spikes: spikelets as in Panicum, imbedded in the surface of a broad rachis forming terminal spikes.—About 3 species of tropical regions, one species found along the Gulf coast, especially in Fla., where it is utilized as a lawn grass. In this respect it is similar to Bermuda-grass, being naturally adapted to a sandy soil, which it binds by its rhizomes and creeping habit as does that grass.

3687 Stenotaphrum secundatum. (×¼)

The introduced form of St. Augustine grass is one of the most valuable lawn grasses for the extreme South. It will grow on almost any soil and thrives even in shade. The leaves are rather broad, never over 6 inches high and require little mowing. This grass does not become coarse, does not hold dew or rain, and is particularly good for house lots and lawns. It does not

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need as much water as Bermuda or St. Lucie grass. It is propagated mostly by cuttings. (E. N. Reasoner.)

secundàtum, Kuntze (*S. americànum*, Schrank). ST. AUGUSTINE GRASS. Fig. 3687. Flowering branches erect, 6–12 in. high. Var. **variegàtum,** has lvs. striped with white, and is used as a basket-plant. G.W. 15:681 (as *S. glabrum*). Dept. Agric., Div. Agrost. 20:42.

A. S. HITCHCOCK.

STEPHANÁNDRA (Greek, *stephanos*, crown, and *aner, andros*, male stamen, alluding to the persistent crown of stamens). *Rosàceæ*. Ornamental shrubs grown chiefly for their handsome graceful foliage.

Deciduous: lvs. alternate, lobed and serrate, stipulate: fls. slender-pedicelled, small, with cup-shaped calyx-tube; sepals and petals 5; stamens 10–20: carpel 1; pod with 1 or 2 shining seeds, dehiscent only at the base.—Four species in China and Japan. Closely allied to Neillia and distinguished chiefly by the cup-shaped calyx-tube and the incompletely dehiscent 1–2-seeded pod.

The stephanandras in cultivation are low graceful spreading shrubs with slender more or less zigzag branches, bright green medium-sized or rather small lobed leaves and small white flowers in loose terminal panicles. They are hardy as far north as Massachusetts, but *S. incisa* is sometimes killed back in severe winters; it grows, however, freely from the base and is not injured in its appearance except that it remains rather low. They are well adapted for borders of shrubberies or rocky banks on account of their graceful habit and handsome foliage. Propagation is by greenwood cuttings under glass, which root readily, and by seeds; also by division, and *S. incisa* by root-cuttings with bottom heat in early spring.

incisa, Zabel (*S. flexuòsa*, Sieb. & Zucc.). Fig. 3688. Shrub, to 8 ft. high, but usually lower, almost glabrous, with angular spreading distinctly zigzag branches: lvs. triangular-ovate, cordate or truncate at the base, long-acuminate, incisely lobed and serrate, the lower incisions often almost to the midrib, pubescent only on the veins beneath and grayish green, ¾–1½ in. long: fls. white, about ⅛in. across, in terminal, short, 8–12-fld., usually panicled racemes; stamens 10. June. Japan, Korea. Gn. 55, p. 141.—"Closely allied to Spiræa and has the spirea style of beauty. It has long, slender branches which are densely and regularly interwoven in a fan-like manner. Its habit of growth is fountain-like, the branches being gracefully pendent. Its fls. are snowy white and, although minute, are so numerous that the plant becomes very showy. It is especially fitted for the back of herbaceous borders or for the front of larger shrubs. Its foliage, which is deeply toothed, is tinted red in early spring and deep glossy green during spring and summer. In the autumn it puts on unusual tints of reddish purple. The foliage becomes so dense that the growth of weeds beneath its thickly set branches is effectually prevented. Prop. by cuttings and layers."

(J. W. Adams.)

3688. Stephanandra incisa. (×⅓)

Tanákæ, Franch. & Sav. (*Neillia Tanákæ*, Franch. & Sav.). Fig. 3689. Shrub, 5 ft. high, almost glabrous: lvs. triangular-ovate, slightly cordate at the base, abruptly long-acuminate, usually 3-lobed and doubly serrate or lobulate, pubescent only on the veins beneath, 1½–3 in. long: fls. in terminal loose panicles, slender-pedicelled, ⅛in. across; stamens 15–20. June, July. Japan. B.M. 7593. Gt. 45:1431. G.W. 4, p. 6.—Handsome shrub much resembling neillia in foliage, coloring in fall brilliant orange and scarlet or yellow.

3689. Stephanandra Tanakæ. (×⅓)

ALFRED REHDER.

STEPHÀNIA (perhaps a personal name; or by some derived from the Greek word for a garland or crown). *Menispermàceæ*. More than 30 climbing shrubs (rarely herbs) of the Old-World tropics, as defined by Diels in Engler's Das Pflanzenreich, hft. 46 (IV. 94), 1910, differing from Cocculus in the solitary ovary, often more than 3-merous fls., and a nearly basal rather than nearly terminal style-scar: lvs. usually peltate: fls. in axillary, simple or compound clusters, diclinous; males with 6–10 free sepals, 3–5 fleshy petals, and 6 connate anthers; females with 3–5 sepals, petals like those of the males, 1 ovary with 3–6-parted style: fr. a glabrous drupe with ring-like seed. The species are little known in cult., although the following may be expected in southern regions or sometimes under glass as an ornamental climber. **S. herandifòlia,** Walp., in India, Austral., Afr., and Malaya, has striate glabrous branches, and ovate or somewhat deltoid obtuse or acute more or less pubescent lvs. 3–6 in. across: fls in capitate peduncled puberulent umbels of 8–12 rays: drupes red. *S. japónica*, Miers (*Cócculus japónicus*, DC.), a common roadside weed in parts of China and Japan, has glabrous lvs. and infl.; probably not cult.

STEPHANOPHÝSUM (Greek, *crown* and *bladder*, in reference to the shape of the crown). *Acanthàceæ*. Herbs with more or less dentate or entire lvs., the fls. in lateral umbellate cymes: fls. red; calyx 5-parted; corolla-tube short, the lobes erect or more or less spreading; stamens 4, didynamous: caps. contracted from the base to the middle. Trop. Amer. with the exception of the below-mentioned. The genus is now included in Ruellia. *S. Balkiei*, Hook. Subshrub, 2–3 ft. high, branches 4-angled, opposite: lvs. opposite, about 6 in. long including the petiole, ovate-lanceolate, entire, acuminate, attenuate at base: panicle terminal, many-fld.: fls.

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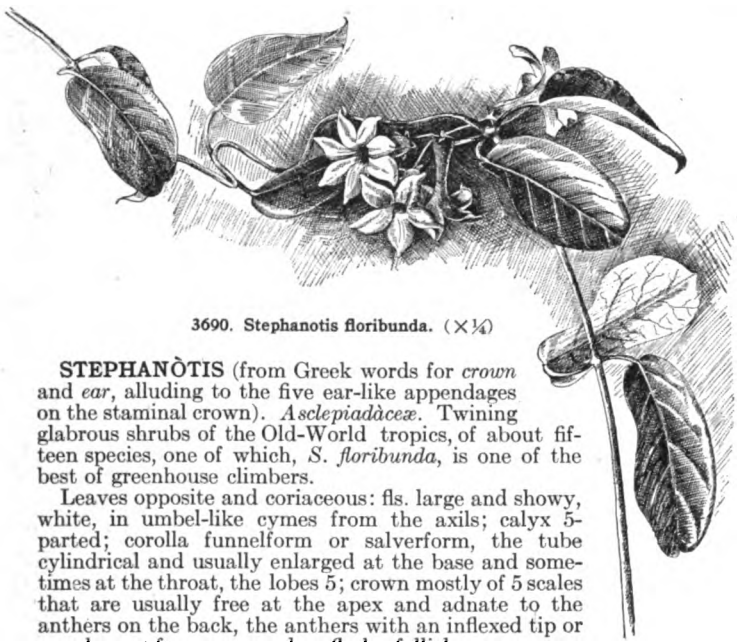
opposite, sessile, scarlet; calyx-segms. narrow, erect, linear-subulate; corolla more than 2 in. long, tubular-funnelform, curved, the lobes triangular; ovary sunk in a large, fleshy, cup-shaped disk. Trop. Afr. B.M. 5111. H.F. II. 3:162.—This species is apparently not known today and has not been recently treated in works on Trop. Afr.



3690. Stephanotis floribunda. (×¼)

STEPHANÒTIS (from Greek words for *crown* and *ear*, alluding to the five ear-like appendages on the staminal crown). *Asclepiadàceæ*. Twining glabrous shrubs of the Old-World tropics, of about fifteen species, one of which, *S. floribunda*, is one of the best of greenhouse climbers.

Leaves opposite and coriaceous: fls. large and showy, white, in umbel-like cymes from the axils; calyx 5-parted; corolla funnelform or salverform, the tube cylindrical and usually enlarged at the base and sometimes at the throat, the lobes 5; crown mostly of 5 scales that are usually free at the apex and adnate to the anthers on the back, the anthers with an inflexed tip or membrane: fr. a more or less fleshy follicle.

There are few plants that have all the good qualities of *S. floribunda*. It is a splendid grower, has good foliage, is very free-flowering, and the flowers last well on the plant or when cut for decorative work. Cuttings are secured from half-matured wood, and can be rooted at any time of year, although spring is the most convenient time. Pot the cuttings singly, in small pots, in a sandy mixture of peat. Place them in a tight case in 70° night temperature. Shade them from the sun and keep the cuttings in a moist condition until they begin to grow. When the small pots are filled with roots, shift them into two or three sizes larger, in a good strong fibrous loam with enough sand added to keep the soil porous. When the shoots have grown to a height of about 2 feet, cut them back several joints. This will make the plants break into several leads. As *S. floribunda* comes from Madagascar, it can stand a good heat, but does not like so humid an atmosphere as many other tropical plants. About 65° will generally be found sufficient after it has started growing in the spring. By midsummer the young plants may receive another potting, and again be cut back to make sure of having a good foundation for the following year. About the end of October, begin to withhold water from the roots, and cease syringing, which must be attended to during the period of active growth. Reduce the temperature to 55° to 60° during the night and give only enough water to keep the leaves from shriveling. As the sun gets higher in March, they will show signs of activity and the weak wood may be all cut back, and the plants repotted in a good strong loam with ample drainage. If not wanted for a specimen plant, stephanotis may be planted out on a well-drained bench and trained to wires over the roof. It is astonishing the amount of space a single plant will cover in course of time. For specimen plants, the shoots should be trained to strings until they set flowers, when they may be trained on a trellis in any shape desired. They will do in the same size of pot for many years, if fed during their growing period as advised for ixoras. Mealy-bug and scale are sure to locate on stephanotis, but during the winter they may be treated to fumigations with hydrocyanic gas, as already advised for other plants, and if syringed well when out of flower, will be easily held in check. (Geo. F. Stewart.)

floribúnda, Brongn. Fig. 3690. Glabrous, 8–15 ft.: lvs. elliptic, with a short point, thick and shining green, entire: fls. 1–2 in. long, of waxy consistency, white or cream-color, very fragrant, in many umbels, the calyx one-fourth or less the length of the corolla-tube: fr. 3–4 in. long, ellipsoid, glabrous, fleshy, containing melon-like seeds which are provided with a tuft of hair. Madagascar. B.M. 4058. G. 6:29, 291; 10:468; 13:622; 25:144; 37:397. Gn. 21, p. 441 (showing a pygmy plant blooming in a small pot and not climbing); 46, p. 208; 55, p. 150; 73, p. 211. G.C. II. 14:169 (a dwarf variety, the Elveston); 24:817; 25:137; III. 17:50. R.H. 1874, p. 368; 1885, pp. 438, 439. H.U. 1, p. 72. J.H. III. 50:165.

S. Thouarsii, Brongn., from Madagascar, appears to be the only other species in cult., but it is not in the American trade. It has obovate lvs., fls. in 3's, and sepals about one-third the length of the corolla-tube. L. H. B.

STERCÙLIA (*Sterculius* of Roman mythology, from *stercus*, manure; applied to these plants because of the odor of the leaves and fruits of some species). *Sterculiàceæ*. Trees grown in the greenhouse, but also outdoors in the South.

Leaves undivided, lobed or digitate: infl. paniculate or rarely racemose, frequently axillary, with the terminal fls. commonly feminine and earlier: fls. unisexual or polygamous; calyx 5-cleft or 5-parted, rarely 4-merous, often colored; petals none; stamens united in a column which bears a head of 10–15 sessile anthers; pistil of as many carpels as calyx-lobes and opposite them, each carpel 2- to many-ovuled, the stigmas free and radiating: fr. follicular, each carpel distinct and either woody or membranaceous and sometimes opening and spreading into a lf.-like body long before maturity (Fig. 3691); seeds 1 to many, sometimes arillate or winged, sometimes hairy.—About 100 species, natives of the warmer regions of the world, most abundant in Asia. Sterculias have very various foliage, the lvs. of different species being simple, palmately lobed or digitate. The fls. are mostly in panicles or large clusters, sometimes large and showy, varying from greenish to dull red and scarlet. The species are grown mostly for street and lawn trees. The kinds that are generally known in this country are *S. platanifolia*, *S. diversifolia*, and *S. acerifolia*, the last two known in Calif. as brachychitons. All are easily grown from seeds. By Bentham & Hooker, Brachychiton is merged in Sterculia; by Schumann in Engler & Prantl it is kept distinct. See *Brachychiton*.

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KEY TO THE SPECIES.

A. *Carpels expanding before maturity into lf.-like bodies, exposing the seeds* ..... 1. **platanifolia**
AA. *Carpels not becoming lf.-like.*
B. *Lvs. all digitately compound*..... 2. **fœtida**
BB. *Lvs. entire or only lobed (sometimes compound on some branches of Nos. 8 and 9).*

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c. *Surfaces of blade, at least the lower, tomentose or pubescent.*
d. *Fls. yellowish white* ..... 3. **apetala**
dd. *Fls. red* ..... 4. **Bidwillii**
cc. *Surfaces of blade glabrous.*
d. *Calyx tubular, the tube much longer than the lobes* ..... 5. **colorata**
dd. *Calyx broadly campanulate, deeply lobed.*
e. *Fls. glabrous* ..... 6. **acerifolia**
ee. *Fls. tomentose, at least outside.*
f. *Follicles globose, about 5 in. diam.* ..... 7. **alata**
ff. *Follicles ovoid, 1–3 in. long.*
g. *Lvs. ovate or ovate-lanceolate, sometimes more or less 3-, rarely 5-lobed or -parted* ..... 8. **diversifolia**
gg. *Lvs. oblong-linear or lanceolate, sometimes 5–9-digitate, parted on some branches* ..... 9. **rupestris**

1. **platanifòlia,** Linn. f. (*Firmiàna plantanifòlia,* Schott & Endl.). JAPANESE VARNISH TREE. CHINESE PARASOL TREE. Fig. 3691. Strong-growing, smooth-barked, round-headed tree of medium size, with deciduous foliage: lvs. very large, glabrous, cordate-orbicular, palmately 3–5-lobed like maple lvs., the lobes sharp-pointed: fls. small, greenish, with reflexed calyx-lobes, in terminal panicles: carpels 4 or 5, bearing globular pea-like seeds.—Said to be native of China and Japan. Hemsley admits it to the Flora of China, and Sargent says in Forest Flora of Japan that it is one of the several Chinese or Korean trees grown in Japan. Bentham, in Flora Hongkongensis, says that it is native to China. Franchet and Savatier, in Enumeratio Plantarum Japonicarum, admit it as an indigenous Japanese species. Now a frequent tree from Ga. south. Hardy also at Washington, D. C. Excellent for lawns and shade. A peculiarity of this tree is that before maturing the frs. are filled with a brownish black fluid which when the pods burst is liberated. Var. **variegàta,** Hort., has lvs. variegated with creamy white. Intro. into Calif.

3691. Mature follicles or fruits of Sterculia platanifolia, bearing seeds on the margins. (×½)

2. **fœtida,** Linn. Tall, handsome tree, with all parts glabrous except the young foliage: lvs. crowded at the ends of the branchlets, of 5–11 elliptic, oblong or lanceolate, entire, pointed, thick lfts.: fls. large, dull red, in simple or branched racemes, appearing with the lvs.: fr. large and woody follicles, glabrous outside, often 3 in. or more in diam. and containing black seeds the size of a hazelnut. Trop. Afr. and Asia to Austral.—Grown in S. Fla. In its native countries the seeds are said to be roasted and eaten.

3. **apétala,** Karst. (*S. carthaginénsis,* Cav. *Helictéres apétala,* Jacq.). Tree, about 40 ft. high: lvs. cordate-rounded, usually more than 1 ft. diam., 5- (-3-) lobed to the middle, glabrous above, velvety beneath, lobes elliptical, obtuse, or oblong: fls. yellowish white with purple spots, about ¾in. across. Mex., Cent. Amer., and Colombia; intro. into Jamaica and Fla.

4. **Bidwillii,** Hook. (*Brachychìton Bidwillii,* Hook.). Shrub or tree, softly pubescent or tomentose all over: lvs. usually deeply 3-lobed, green, soft-villous on both sides, lobes acuminate: calyx narrow tubular-campanulate, 1–1½ in. long, red. Austral. B.M. 5133.

5. **colorata,** Roxbg. Large tree, bark ashy: lvs. roundish, 5–9 x 5–12 in., glabrescent, palmately 3–9-lobed, lobes triangular, acuminate, base cordate; petiole 4–9 in. long: panicle terminal, many-fld.; pedicels covered with orange-red tomentum: calyx ¾in. across, tubular, clavate, orange-downy outside, pilose within: follicles 2–3 in. long, stipitate, glabrous, membranous. India.—Intro. into Calif.

6. **acerifòlia,** A. Cunn. (*Brachychìton acerifòlium,* F. Muell.). BRACHYCHITON. FLAME TREE. Evergreen tree, reaching a height of 60 ft., glabrous: lvs. long-petioled, large, deeply 5–7-lobed, the lobes oblong-lanceolate to rhomboid, glabrous and shining: fls. brilliant scarlet, the calyx about ¾in. long, in large, showy trusses: follicles large, glabrous, long-stalked. Austral.—A most showy tree when in bloom, and planted on streets and lawns in Calif. Thrives in either dry or fairly moist places. (See also page 538.)

7. **alàta,** Roxbg. Large tree, the young parts yellow-pubescent, the bark ash-colored: lvs. large, cordate-ovate, acute, 7-nerved: fls. about 1 in. across, in few-fld. panicles shorter than the lvs., and which arise from the leafless axils, the calyx tomentose and the segms. linear-lanceolate: follicles 5 in. diam., globose, with wide-winged seeds. India.—Intro. into S. Fla.

8. **diversifòlia,** Don (*Brachychìton populneum,* R. Br.). BRACHYCHITON. Tall tree, glabrous except the fls.: lvs. very various, mostly ovate to ovate-lanceolate in outline, often entire, sometimes variously 3–5-lobed on the same tree, all parts acuminate: fls. tomentose when young, bell-shaped, greenish red and white or yellowish white, in axillary panicles: follicles 1½–3 in. long, ovoid, glabrous, stalked. Austral.—Planted in Calif., and commoner than the last. (Page 538.)

Var. **occidentàlis,** Benth. (*Brachychìton Grégorii,* F. Muell. *S. Grégorii,* Hort.). Lvs. deeply 3-lobed, the lobes narrow, sometimes with short lateral ones: fls. salmon-color; calyx smaller and more tomentose. W. Austral.—Offered in S. Calif.

9. **rupéstris,** Benth. (*Delabèchea rupéstris,* Lindl.). BOTTLE-TREE. Considerable tree: trunk often swelling out to a large size, contracted top and bottom: lvs. glabrous, either quite entire and oblong-linear or lanceolate, 3–6 in. long, or digitate, consisting of 5–9 linear-lanceolate, sessile lfts. often above 6 in. long: calyx about 4 lines long, campanulate, tomentose both inside and out: follicles ovoid, acuminate, about 1 in. long, on stalks longer than themselves. Austral.

S. acumindta, Beauv.=Cola acuminata.—*S. Russelliàna,* Hort., is said to be an aralia-like plant with the main st. and petioles light green and the narrow divisions of the lf. very dark green. Offered in the trade but not known botanically.

F. TRACY HUBBARD.†

STEREOSPÉRMUM (Greek, *hard seed*). *Bignoniàceæ.* About 12 species of tropical evergreen trees in Afr. and E. India, with handsome once- or twice-pinnate foliage and large bignonia-like fls., pale yellow or rose-colored to purple, in large and loose terminal panicles; calyx campanulate, 2–5-lobed or 5-toothed; corolla funnelform-campanulate, with round crisped or toothed lobes; stamens 4, included; disk cupulate: caps. terete or 4-angled, 2-valved; seeds in 2 rows, with the thick nutlets deeply impressed in the thick spongy septum. Only the following species seems to be in cult.

S. suavèolens, DC. Tree, 30–60 ft.: lvs. simply pinnate, 12–18 in. long; lfts. 7–9, broadly elliptic, acuminate or acute, entire or serrulate, hairy while young, about 5 in. long: panicle many-fld., viscous-pubescent: calyx campanulate, with 3–5 short lobes; corolla 1½ in. long, pale or dark purple, puberulous outside, with crenately crisped lobes: caps. 18 in. long. India.—Adapted for tropical or subtropical regions only and prop. by seeds or cuttings, also by air-layering.

S. sinicum, Hance=Radermachia sinica.

ALFRED REHDER.

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STERIPHÒMA (Greek, *foundation*, alluding to the large peduncle of the fruit). *Capparidàceæ*. Unarmed shrubs with the branches and infl. stellate-pubescent, grown in the warmhouse: lvs. long-petioled, with 1 lft. which is lanceolate, entire; the petiole thickened at the top: fls. showy, orange, in terminal racemes; the pedicels bent or curved down, 1-fld.; calyx cylindrical-campanulate, 2–4-lobed at the top; receptacle very short, expanded into a ring-like disk; petals 4, sessile; stamens 6; ovary ovate or oblong: berry globose or angulate, corticate, pulpy.—Four species, Trop. Amer.

paradóxum, Endl. (*S. cleomoìdes*, Spreng.). Leafy shrub, 4–10 ft. high: branches erect or ascending, slender: lvs. alternate, crowded toward the ends of the branches, 4–7 in. long, oblong or ovate-oblong: raceme terminal, dense-fld., 1–3 in. long: fls. abruptly deflexed from the apex of the orange-yellow pedicels; calyx bright orange, oblong-cylindric, irregularly split halfway down; petals linear-oblong, pale yellow: fr. said to be cylindrical. Venezuela. B.M. 5788. F.S. 6:564–565. Gt. 57, p. 242.

STERNBÉRGIA (named for Count Caspar Sternberg, a botanist and writer, 1761–1838). *Amaryllidàceæ*. Low-growing bulbous herbs, hardy and used for outdoor planting.

Leaves produced after or with the fl., strap-shaped or linear: scape short: fls. frequently solitary, rarely 2, bright yellow; perianth funnel-shaped, erect, tube short or rather long, lobes linear or lanceolate, erect-spreading; filaments filiform, free; ovary 3-celled: fr. fleshy, ovoid or oblong, scarcely dehiscent; seeds subglobose.—About a dozen species, E. Eu. to Asia Minor. The

3692. Sternbergia lutea. (×⅓)

bulbs should be planted rather deeply, about 6 in. J. N. Gerard says of their culture in G.F. 10:158 that they require a rather heavy soil, in a somewhat dry sunny position where they will be well ripened in summer.

A. *Fls. and lvs. appearing together.*

B. *Blooming in fall.*

lûtea, Ker-Gawl. (*Amarýllis lùtea*, Linn.). Fig. 3692. Bulb about 1½ in. through: lvs. 6–8 to a bulb, strap-shaped, becoming 1 ft. long: fls. yellow, 1–4 to a bulb; tube less than ½in. long; perianth-segms. about 1½ in. long. Medit. region of Eu. and Asia. B.M. 290. Gn. 44, p. 365; 47, p. 114. G.C. II. 13:21. J.H. III. 45:227. Var. **màjor,** Hort., has fls. much larger than those of the type.

BB. *Blooming in spring.*

Fischeriàna, Roem. Has the habit of *S. lutea*, but differs in season of bloom and stipitate ovary and caps. Wm. Watson says (G.F. 8:144) that the fls. are a brighter yellow and as large as the largest forms of *S. lutea*. Caucasus. B.M. 7441. Gn.W. 22:307; 24:131.

AA. *Fls. and lvs. appearing at different seasons.*

B. *Lvs. linear: fls. small.*

colchicifl̀ora, Waldst. & Kit. Bulb about ½in. through: lvs. appearing in spring, 3–4 in. long: fls. yellow, in fall; segms. about 1 in. long by 2 lines broad. E. Eu., Asia Minor. B.R. 2008.

BB. *Lvs. strap-shaped: fls. large.*

macrántha, J. Gay. Bulb globose, 1½ in. through, with a long neck: lvs. becoming 1 ft. long, nearly 1 in. wide, fully developed in June: fls. bright yellow, 3–5 in. across; segms. about 1 in. broad. Oct. Asia Minor. G.C. III. 23:97; 28:265. Gn. 47:114. B.M. 7459. G. 24:497; 25:297. G.M. 44:47. H.F.II. 3:248 (as *Oporanthus macranthus*, Hort.).—A handsome species.

F. W. BARCLAY.

STEUDNÈRA (bears the name of Steudner, a German botanist). *Aràceæ*. About 5 or 6 perennial herbs of E. Asia, sometimes seen under glass in choice collections, requiring the treatment of other aroids. Plant with a mostly short ascending sheathed caudex, and ovate-oblong long-stalked peltate lvs.: spathe ovate-lanceolate, recurving above the middle and convolute at base, much surpassing the spadix: fls. imperfect, the female with a subglobose 1-loculed ovary and 2–5 short staminodia: fr. a many-seeded berry. **S. colocasiæfòlia** Koch. St. short and fleshy: lvs. green above and paler beneath, the petioled often colored: spathe yellowish, purple or reddish inside; spadix whitish, erect, one-third as long as the spathe. **S. díscolor,** Bull (*S. colocasiæfòlia* var. *díscolor*, Hort.), has purple-blotched lvs., and spathe yellow on both surfaces but reddish at base. These plants are warmhouse subjects, grown for the foliage and interesting habit, as well as for the infl.

STEVENSÒNIA (named after one of the governors of Mauritius). *Palmàceæ*, tribe *Arèceæ*. A monotypic genus of tropical palms from the Seychelles. Tall trees, spiny throughout or at length nearly smooth, with ringed caudex: lvs. terminal, spreading-recurved, the cuneate-obovate blade convex, bifid, oblique at the base, plicate-nerved, the margins split, segms. deeply cut, the midnerves and nerves prominent, scaly beneath; petiole plano-convex; sheath deeply split, scaly, spined; spadix erect: peduncle long, compressed at the base: branches thickish: spathes 2, the lower one persistent, prickly, the upper one smooth, woody, club-shaped, deciduous: fr. ellipsoidal, small, orange-colored. For cult., see *Palm*.

grandifòlia, Duncan (*Phœnicophòrium sechellàrum*, Wendl.). Caudex 40–50 ft. high, very spiny when young, less so when old; petiole 9–18 in. long, pale green; blade cuneate-obovate, shortly bifid, about 6–7 ft. long and nearly as broad: spadix 3–6 ft. long, bearing many yellow fls. Seychelles. I.H. 12:433. B.M. 7277. Gn. 23, pp. 173, 320.—Probably not cult. in Amer. The name Phœnicophorium (THIEF-PALM) commemorates the alleged theft of one of the original plants from Kew by a gardener in 1857. Phœnicophorium is antedated by Stevensonia, although a nomen nudum.

JARED G. SMITH.
N. TAYLOR.†

STÈVIA: for the Stevia of florists, see *Piqueria*. True Stevias are described in horticultural literature, but it is not known that any of them are now in the American trade.

STEWÁRTIA (in honor of John Stuart, Earl of Bute, a patron of botany; 1713–1792). Sometimes spelled *Stuártia*. *Ternstrœmiàceæ*. Ornamental woody plants chiefly grown for their large and showy flowers.

Deciduous shrubs or trees with smooth flaky bark: lvs. alternate, short-petioled, serrate: fls. axillary or subterminal, short-stalked, with 1 or 2 bracts below the calyx; sepals and petals 5 or sometimes 6, the latter obovate to almost orbicular, usually concave, with crenulate margin, connate at the base with each other and with the numerous stamens; styles 5, distinct or

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connate: fr. a woody, usually hirsute caps., loculicidally dehiscent into 5 valves; seeds 1–4 in each locule, compressed, usually narrowly winged.—Six species in E. N. Amer. and E. Asia.

The stewartias are very desirable ornamental plants, with handsome bright green, rather large foliage which turns deep vinous red or orange and scarlet in fall; they are very attractive in midsummer with their white cup-shaped flowers, which are in size hardly surpassed by any others of our hardier shrubs. *S. pentagyna* and *S. Pseudo-Camellia* are hardy as far north as Massachusetts, while *S. Malachodendron* is tender north of Washington, D. C. They thrive best in deep, rich, moderately moist and porous soil, preferring a mixture of peat and loam, and, at least in more northern regions, a warm, sunny position. Propagation is by seeds sown soon after maturity and by layers; also by cuttings of half-ripened or almost ripened wood in late summer under glass.

A. *Styles united; petals always 5.*

B. *Stamens purple, spreading: caps. subglobose.*

Malachodéndron, Linn. (*S. virginica,* Cav.). Shrub, 6–12 ft. high: lvs. oval to oval-oblong, acute at both ends, serrulate, light green, pubescent beneath, 2½–4 in. long: fls. 3–4 in. across, with obovate spreading petals: seeds wingless, shining. May, June (July and Aug. in the N.). Va. and Ark. to Fla. and La. Gn. 14:136; 18, p. 628; 34, p. 280. G.C. II. 8:433; III. 42:32; 44: 132. F.S.R. 1, p. 71; 3, p. 264. G. 29:309. B.M. 8145. —This is one of the showiest species, but tender.

BB. *Stamens with whitish filaments, incurved: caps. ovate, pointed.*

C. *Bracts beneath the calyx large and lf.-like.*

sinénsis, Rehd. & Wilson. Shrub or tree, to 30 ft.: lvs. oblong-elliptic to elliptic-obovate, acuminate, serrulate, glabrous or sparingly pubescent beneath, 2–4 in. long: fls. with large serrulate or entire bracts at the base, white, 2 in. across; stamens connate at the base, pubescent: fr. subglobose, pointed, ¾in. across. Cent. China.

3693. Stewartia Pseudo-Camellia. (×½)

monadélpha, Sieb. & Zucc. Shrub or small tree: lvs. oval to oval-oblong, acute at both ends, remotely serrulate, slightly pubescent beneath, light green, 1½–2½ in.

3694. Stewartia pentagyna. (×½)

long: fls. white, 1½ in. across, with flat, spreading, obovate petals; stamens connate at the base; anthers violet: fr. about ½in. across. Japan. S.Z. 1:96.—This is the least desirable species and probably as tender as the preceding; it is doubtful whether it is in cult. Plants intro. under this name seen by the writer proved to be *S. Pseudo-Camellia.* Also the closely allied *S. serràta,* Maxim., differing in its glabrous lvs. and larger fls. with serrate sepals and distinct stamens is apparently not yet intro.

CC. *Bracts small, shorter than calyx.*

Pseùdo-Camélia, Maxim. (*S. grandiflòra,* Briot. *S. japónica* var. *grandiflòra,* Hort.). Fig. 3693. Shrub, with upright branches, or tree attaining 50 ft. or more in Japan: trunk with smooth red bark, peeling off in larger thin flakes: lvs. elliptic to elliptic-lanceolate, acute at both ends, or often acuminate at the apex, thickish, bright green, glabrous or nearly so beneath, 1½–3 in. long: fls. hemispherical, 2–2½ in. across; petals almost orbicular, concave, silky-pubescent outside; anthers orange-colored: seeds 2–4 in each cell, narrowly winged, dull. July, Aug. Japan. B.M. 7045. R.H. 1879:430. G.C. III. 4:187. Gn. 43:172. G.F. 9:35 (adapted in Fig. 3693). M.D.G. 1900:480. R.B. 28, p. 81. F.S.R. 3, p. 263. J.H. III. 54:57. S.I.F. 1:73.

AA. *Styles 5, distinct: petals often 6.*

pentágyna, L'Her. (*Malachodéndron ovàtum,* Cav.). Fig. 3694. Shrub, 6–15 ft. high: lvs. ovate to oblong-ovate, acuminate, usually rounded at base, remotely serrate, sparingly pubescent and grayish green beneath, 2½–5 in. long: fls. cup-shaped, 2–3 in. across; petals obovate, with wavy crenulate margin; stamens white, with orange-yellow anthers: caps. ovate, pointed, sharply 5-angled; seeds narrowly winged. July, Aug. N. C. and Ga. to Tenn. and Fla. B.M. 3918. B.R. 1104. M.D.G. 1900:479. H.U. 3, p. 366. This shrub is handsomer than the preceding species and as hardy. Var. **grandiflòra,** Bean. Fls. 4–4½ in. across, with purple stamens. A very desirable variety which was found along with the yellow-stamened one in the woods of Ga.; the flowers are as beautiful as those of *S. Malachodendron,* and the plant is much hardier.

ALFRED REHDER.

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STIGMAPHÝLLON (Greek, *stigma* and *leaf;* referring to the leaf-like appendages of the stigmas). Sometimes written *Stigmaphyllum*. *Malpighiàceæ*. Woody vines, grown in the warmhouse and also out-of-doors in the extreme South.

Leaves usually opposite, entire or denticulate, rarely lobed; petiole with 2 glands; stipules minute: fls. yellow, in umbel-like corymbs which are peduncled and axillary; calyx 5-parted, 8-glandular; petals clawed, unequal, glabrous, stamens 10, unequal, 6 perfect, 4 without anthers or deformed; ovary 3-celled, 3-lobed, dorsal lobe gibbous: samaræ 1–3, extended above into a wing.—About 55 species, Trop. Amer.

ciliàtum, A. Juss. A tender woody twining vine: lvs. evergreen, smooth, opposite, cordate, ciliate: fls. bright yellow, large, in peduncled axillary clusters of 3–6. P.M. 15:77. Gn. 33:170.—Apparently the only species in the trade and possibly the handsomest of the genus. G. W. Oliver says that *S. ciliatum* is one of the best medium-sized vines for outdoor trellis-work. For pot culture it is of little service and thrives in the greenhouse only when planted out. Sept. is the best month for prop. On outdoor plants much of the wood is useless for this purpose, being thin and soft. Choose the wood made early in the season; a heel or joint is not necessary; root in bottom heat and carry through the winter in the greenhouse as small plants. It is said that in S. Calif. it must have shade, protection from dry or hot winds, and an open soil. Under the right conditions it flowers admirably.

littoràle, A. Juss. A tall leafy climber: lvs. opposite and alternate, long-petioled, 2–5 in. long, varying in shape: fls. yellow, in profusion, borne on pedicels ½–1½ in. long; peduncles axillary, solitary; corymbs terminal, simple or compound; corolla 1 in. diam. Autumn. Argentina. B.M. 6623.

F. Tracy Hubbard.†

STILLÍNGIA (for Dr. Benj. Stillingfleet, an English botanist of the eighteenth century). *Euphorbiàceæ*. Shrubs or herbs, chiefly of the American tropics, one rarely cultivated and used in medicine.

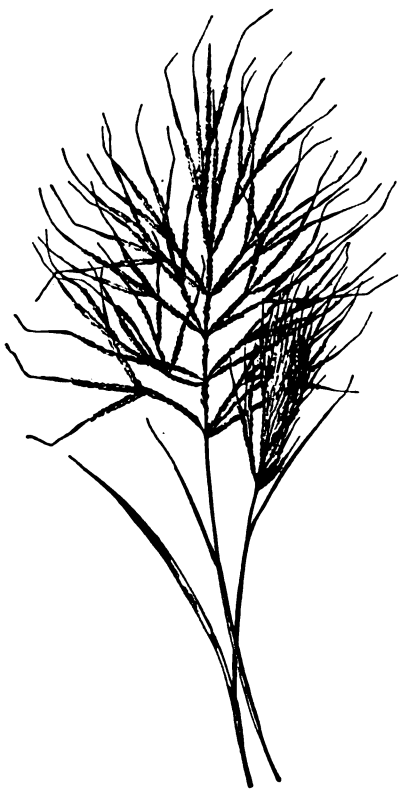
Glabrous, juice milky: lvs. alternate, simple, short-petioled to sessile, the petiole and bracts biglandulose: fls. in terminal spikes, monœcious, apetalous, the staminate above with the 2–3-lobed calyx imbricate, stamens 2–3, filaments free; the pistillate few, at the base of the spike; ovary 2–3-celled, 1 ovule in each cell: base of the caps. persistent as a 3-pointed piece; seeds usually carunculate.—About 25 species. Related to Sapium and Hura. The root of *S. sylvatica* is used in medicine. The plant is occasionally grown and will stand temperatures at least to —10° F. It is readily grown from seeds but is not easily transplanted.

sylvática, Linn. Queen's Delight. Queen's-Root. Yaw-Root. Root perennial, woody: sts. clustered, herbaceous, 1–3 ft. high, with an umbel-like top: lvs. lanceolate to oval or oblong, glandular, crenulate to obtusely serrate, acute or obtuse: spikes 2–3 in. long: fls. small, yellow. Spring to fall. Va. to Texas.

S. sebíferum=Sapium sebiferum.

J. B. S. Norton.

STÌPA (Greek, *stipe*, tow, in allusion to the plumose awns of some of the species). *Gramíneæ*. Perennial grasses with narrow involute lvs. and usually loose panicles: spikelets 1-fld.; glumes membranaceous, longer than the indurated lemma; lemma with a sharp hairy callus below and a stout persistent twisted awn above, falling from the glumes at maturity.—A large genus of about 100 species, throughout the world except the colder parts. Particularly characteristic of the plains, savannas, and steppes. The long-awned, sharp-pointed frs. of some species are troublesome or even dangerous to stock, especially sheep, on account of their tendency to work through the skin and into the vital organs. The species here mentioned are cult. for ornament, including the making of dry bouquets.



3695. Stipa elegantissima. (×⅓)

3696. Stipa pennata. (×⅓)

A. *Awns and pedicels not plumose.*

B. *Fr. or mature lemma, excluding the long awn, ½–1 in. long.*

capillàta, Linn. Similar to *S. spartea:* fls. more numerous but smaller in every way; lemma about ⅓in. long; lower part of awn only minutely pubescent, the upper or bent portion sinuous. Plains, Eu.

spártea, Trin. Porcupine-Grass. Culms 2–3 ft., in bunches: panicles contracted; glumes broad, nerved, about 1½ in., tapering to a slender point; lemma nearly 1 in.; awn usually about 6 in. long, the lower half erect, pubescent but not plumose, strongly twisted, the upper half bent to one side, rough. Ill. to Calif. Dept. Agric., Div. Agrost. 20:62.

BB. *Fr. or mature lemma, excluding the short awn, less than ¼in. long.*

arundinàcea, Benth. (*Apèra arundinàcea*, Hook.). Culms 2–5 ft.: panicles open, large, nodding; spikelets minute, 1½ lines long, the awn about ⅓in. long. New Zeal. Hook. Fl. New Zeal., pl. 67. Exaggerated figure shown in G.C. III. 22:283.

spléndens, Trin. (*Lasiagróstis spléndens*, Kunth). Culms 3–6 ft.: panicles rather dense, about 1 ft. long, nodding; spikelets numerous, small, the glumes less than ¼in., pearly and shining, tinged with purple at the base; lemma ⅜in., villous, the awn ¼–½in. Steppes of W. Asia.

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AA. *Awns or pedicels plumose.*

B. *The pedicels plumose.*

elegantíssima, Labill. Fig. 3695. Culms 2–3 ft., erect from a horizontal rhizome: lvs. narrow and erect: panicle very loose, 6–8 in. long, the capillary panicle branches and pedicels plumose; spikelets 4–6 lines long; awn 1¼ in. long. Austral.—Thrives in sandy soil.

BB. *The awns plumose.*

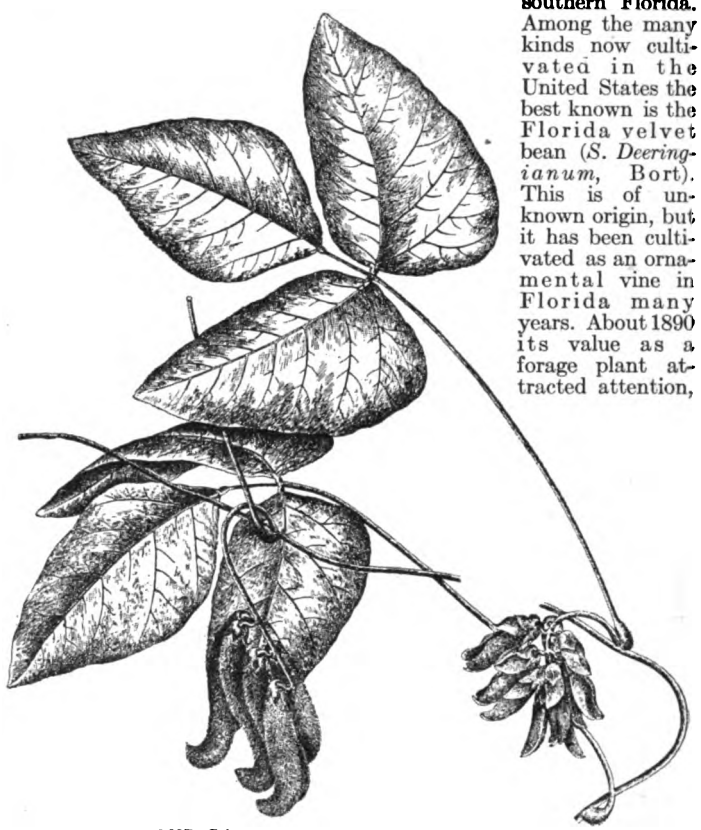
pennàta, Linn. FEATHER-GRASS. Fig. 3696. Culms 2–3 ft., in bunches: glumes narrowed into awns an inch or more long; lemma ½in. or more long; awn about a foot long, the lower portion smooth and twisted, the upper very plumose, giving the panicle a feathery ornamental appearance. Sometimes erroneously called *S. gigantea.* Steppes of Eu. and Siberia. Gn. 9, p. 199. V. 3:247. R.H. 1890, p. 489.

tenacíssima, Linn. ESPARTO-GRASS. Culms 2–3 ft., in bunches: lvs. narrow, smooth, cylindrical, elongated: panicles contracted; awn 1–2 in., plumose below the bend. Spain and N. Afr.—The lvs. furnish fiber from which are made ropes, mats, paper, and the like. In Afr. it is called halfa or alfa. A. S. HITCHCOCK.

STIZOLÒBIUM (name refers to the stinging pods). *Leguminòsæ.* VELVET BEAN. Some of the species are grown as ornamental vines in warm countries, as the growth is very strong, but the genus is valuable mostly for its forage species and therefore does not demand extended treatment here.

These plants are allied to Glycine, which includes the soybean. The lvs. are large and 3-foliolate: fls. in axillary clusters, long or oblong, large, dark purple (sometimes white or yellowish) but turning black when dried, the corolla much longer than the narrow-lobed calyx; the keel long, boat-shaped and usually twice or thrice longer than the obtuse standard and also longer than the wings; stamens diadelphous (9 and 1) the anthers not uniform in kind: pod often hairy, bristly or pubescent, containing pea-like seeds.—Species perhaps a dozen, tropics of Old World. The genus Stizolobium was formerly included under Mucuna, but is now distinguished from that genus (which see, p. 2074, Vol. IV) by its seed and other characters. In Stizolobium the seeds are nearly spherical, or flattened-oval in shape, with the hilum covering often less than one-sixth of its circumference and never more than one-fourth, while in Mucuna the seeds are nearly circular in outline, flattened, and with the hilum extending at least three-fourths of its circumference. In germination Mucuna has alternate scale-like lvs., while Stizolobium has petioled, trifoliate lvs. with cordate lfts. Mucuna is perennial, while Stizolobium is strictly annual. Such species of Stizolobium as are cult. for forage have pods which are nearly smooth, or are covered by a dense velvety pubescence; but there are a number of other species, notably *S. pruriens,* grown in the tropics, in which the pods have a dense covering of bristly stinging hairs, and are known under the common name of "cowage" or "cowitch."

The principal economic use of the velvet beans or stizolobiums is as a winter pasture crop in the southern states. They are commonly planted with corn, the stalks of which give the necessary support, without which they produce few seeds. Some cultivators plant two rows of corn and then one row of the beans, while others plant the beans in alternate hills with the corn; the former method gives more corn to the acre, while the latter yields the heavier crops of beans. The crop is seldom cut for hay, as the vines are too long and tangled to be handled easily, but is left in the field until it is killed by frost, and is then grazed, as the vines, leaves, and seeds may remain on the ground a long time without injury from frost or rain. There are many varieties of this bean, some of which mature in about one hundred days from planting, while others fail to ripen without ten to eleven months free of frost. Some varieties produce profitable crops as far north as Tennessee, while others often fail to mature even in southern Florida. Among the many kinds now cultivated in the United States the best known is the Florida velvet bean (*S. Deeringianum,* Bort). This is of unknown origin, but it has been cultivated as an ornamental vine in Florida many years. About 1890 its value as a forage plant attracted attention,



3697 Stizolobium pruriens, or cowitch. Flower-cluster usually longer and more tapering. (× about ¼)

and thousands of acres are now grown for feeding cattle and hogs. This species makes a wonderful growth, producing vines 60 to 100 feet in length, and bearing clusters of large purple pea-shaped flowers which are followed by pods 2 to 3 inches in length containing four to six nearly spherical seeds. In recent years several sports or varieties have been developed, which mature seed in 110 to 130 days from planting, and are now cultivated largely in the region from Florida northward to northern Georgia and Tennessee. Among the more common of the recently introduced kinds are the Lyon velvet bean (*S. niveum,* Kuntze) which bears racemes fully 3 feet in length with white flowers; the Chinese, which is similar but has shorter racemes and matures much earlier; the Black (*S. capitatum,* Kuntze), which has very long racemes with purple flowers, and late-ripening pods covered with a velvety pubescence; and the Yokohama (*S. Hassjoo,* Piper & Tracy), which matures within three to four months from planting. In addition to these there are numberless crosses and hybrids. As all the species are natives

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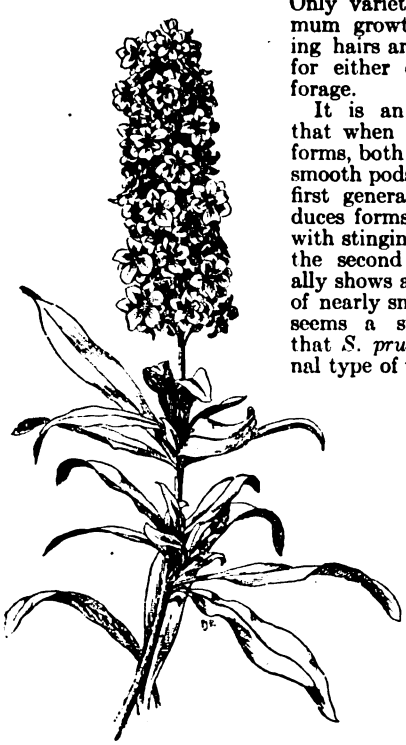
of tropical or semi-tropical regions they require a long season without frost for their successful cultivation. For botanical and other accounts, see Bulletins Nos. 141 and 179, Bureau of Plant Industry, United States Department of Agriculture; also Belling on inheritance problems in crossing stizolobiums, Report of Florida Experiment Station for 1914.

The varieties mostly grown for ornament are the Lyon, with flowers in racemes often 3 feet in length; the Chinese, which is very similar to the Lyon but has shorter racemes and blooms much earlier; and varieties of *S. chlorospermum*, Piper & Tracy, with flowers light purple. All of these have pods 5 to 6 inches in length, *f*-shaped (the ends curved in opposite directions), somewhat brown- or gray-bristly. The most common species in this country is the Florida Speckled, *S. Deeringianum*, Bort. (Fig. 3697), which has been grown in Florida many years, and has been commonly known as "the vine." This seldom matured much seed north of central Florida, but in recent years several varieties have been developed which mature as far north as Tennessee. The pods of this species are usually less than 3 inches long, and are covered with a black velvety pubescence. All are annual climbers, growing to a great length. The branches are somewhat appressed-hairy, the leaves more or less silky beneath, leaflets ovate, or the lateral ones rhombic-ovate, obtuse but apiculate.

The cow-itch or cowage, *S. pruriens*, Medic. (*Dolichos pruriens*, Linn. *D. multiflorus*, Hort. *Mucuna pruriens*, DC.), is apparently the oldest species known, and has become naturalized in the West Indies, but is not grown in the United States. The pods of this species are red or reddish black in color, nearly straight, and 4 to 5 inches in length. They are very bristly-hairy, the bristles are easily dislodged by a touch and are extremely irritating to the skin, often producing troublesome blisters. In the West Indies a decoction of these hairs is often used as a remedy for intestinal worms. Only varieties with a minimum growth of these stinging hairs are ever cultivated for either ornament or for forage.



3698. Double stock.—Matthiola incana var. annua. (×⅓)

It is an interesting fact that when any two distinct forms, both having relatively smooth pods, are crossed, the first generation always produces forms heavily covered with stinging hairs, although the second generation usually shows a large percentage of nearly smooth pods. This seems a strong indication that *S. pruriens* is the original type of the genus. Cattle have been fed successfully on the meal made of the beans ground in the pod, but persons have been made sick by eating the green cooked beans, and chickens have been killed by both raw and cooked beans. Because of its vigorous growth, the velvet bean promises well as a soil-renovator, as the cowpea does, although it can not be grown so far north as that plant. It is a good ornamental plant, growing 10 to 20 feet high when supplied with support. The handsome globular beans (⅛ to ½ inch diameter.) have marking which suggests the castor bean.

S. M. Tracy.

STOBÆA (named for D. Stobæus, a Swedish patron of Linnæus). *Compósitæ*. Somewhat shrubby plants or herbs commonly with aspect of thistles as to the foliage. Leaves usually decurrent, dentate, pinnatifid or pinnatisect, lobes dentate and spiny: heads small to large, solitary or somewhat corymbose; rays usually yellow.—About 70 species. Now considered to be only a section of the genus *Berkheya*, and so named below.

B. membranifòlia, Hubb. (*Stobæa membranifòlia*, DC.). St. herbaceous, erect, cobwebby above: lvs. thin membranaceous, glabrous above, white-tomentose beneath; radical long-petioled, bordered with slender spines, oblong or elliptical, sinuate; cauline more copiously woolly beneath, more or less sinuous or pinnatifid, decurrent in ciliate-spinose sinuous st.-wings: heads solitary: fls. pale yellow. July, Aug. S. Afr.

B. purpùrea, Benth. & Hook. (*Stobæa purpùrea*, DC.). A half-hardy, probably biennial plant 2–3 ft. high: lower lvs. about 1 ft. long, irregularly lobed, spiny on the margins, cottony beneath, dark green above: st.-lvs. smaller, long-decurrent: fl.-heads 3 in. across, purple to white, resembling a single dahlia. G.C. 1872: 1261.—To be recommended for growing with half-hardy alpines. It can be wintered in a coldframe. Prop. by seed and division.

B. Rádula, Hubb. (*Stobæa Rádula*, Harv.). St. herbaceous, erect, angle-furrowed: radical lvs. obovate-oblong, obtuse, tapering to the base, some somewhat petioled, roughly setose at first then scabrous with hard points above, white-woolly beneath; cauline lvs. small, narrow-oblong or linear, very spiny, decurrent in long, narrow, very spinose st.-wings: infl. racemose-corymbose; heads short-radiate. S. Afr.

F. Tracy Hubbard.

STOCKS. Popular florists' flowers, single and double, white, blush, pink, purple, yellowish, valuable for cut-flowers (Fig. 3698). They are divided into two groups, summer and winter stocks. The former are annuals and therefore bloom the first summer; the latter are biennials and bloom the second year, or, if sown very early, late in the fall or the winter of the first year. Fall or intermediate stocks are between these two groups; they bloom profusely in the autumn. See *Matthiola;* also *Cheiranthus* for the closely related wallflower (also *Wallflower*). Virginian stock is a very different plant and is not a regular florists' flower; it is grown for its small fragrant single fls.; see *Malcomia*.

Florists now frequently grow stocks in benches instead of carrying them through as potted plants. They are in considerable demand for Memorial Day. After the early bedding plants are removed to the frames, the benches are filled with soil and the plants that have been growing in pots since the seed was sown in December are then planted in them. Stocks may also follow chrysanthemums, the seed having been sown in August.

The seed of the summer stocks, or, as they are commonly called, "ten-weeks' stocks," is sown from the end of February until April, mostly in a lukewarm hotbed, which must be sunny and well aired. Good clean garden soil, well mixed with sand and free of manure, is proper soil in which to sow the seed. The seed will germinate in six to ten days, the light-seeded sorts germinating more quickly than the dark-seeded kinds. Air must be admitted as soon as the seeds have sprouted, very much in warm weather and less when the weather is raw, until finally the sash may be entirely removed during the day. If the seedlings need water it should be given in the morning, so that they are dry at night. If

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the sun is hot the seedlings must be shaded. If the seed is to be raised from pot-grown plants a good well-manured, sandy garden soil should be used which contains an admixture of well-rotted sod or the soil taken from river-bottoms. The pots are about 6 inches high, with a diameter of 7 inches. When they show their fourth leaf the seedlings are planted firmly into these pots with a dibber, pots being well filled with the above soil; care should be taken that the roots are inserted vertically. From six to eight plants are put into such a pot. These pots are then placed on sunny stages, usually protected by tilt-roofs. The development of the plants depends now principally on careful watering, which is done mostly with watering-pots and at the beginning with a fine spray attached to the spout of the pot. After a crust has formed on the top of the soil, the spray is discontinued and the pots are watered with the pipe of the can. This watering is done at night during warm weather and in the morning when the weather is cold. Very little watering is necessary in continuously cloudy or rainy weather. The watering of the stocks is the most particular and important part in the cultivation in pots, for if due care is not exercised a white maggot will make its appearance while the plants are in bud and destroy the roots. The common flea-beetle is another of the enemies of stocks; this often appears in large numbers and eats the leaves of the young plants. Frequent syringing with water is the only remedy found so far against these pests when they infest stocks.—After the plants have been in bloom for some time the double-flowering specimens are cut out and the watering is continued carefully until the seed-pods which form in the single plants show indications of ripening, which is in October. The plants are then pulled and tied in bundles, which are hung up in dry sheds until the middle or the latter part of November and December, in which time the seed fully matures in the pods. Now comes the most important part of seed-saving of stocks. The bundles of plants are taken down, the roots and part of the stems cut off, and the stalks are taken in hand by expert gardeners who sort them for common seed and also for the seed-stock. The pods indicate by their shape, size, and form whether the seeds contained therein will produce a high percentage of double flowers the following year, and the selection is made with care. The seed that goes on the market can be vastly improved by the removal of "wild" pods, which contain seeds that produce nothing but single flowers. The seeds are removed by hand from the pods, mostly by women and children. CARL CROPP.

STOKÈSIA (Jonathan Stokes, M.D., 1755–1831, English botanist). *Compósitæ*. STOKES' ASTER is one of the choicest and most distinct of American hardy perennial herbs, although little planted.

Heads many-fld.; marginal fls. much larger, deeply 5-cut: involucre subglobose; outer leafy, the inner with foliaceous, pectinately spinulose-ciliate, spreading appendages; receptacle fleshy, flat, and naked: achene 3–4-angled, smooth: pappus of 4–5 thread-like, deciduous scales. The species is a blue-fld. plant about a foot high which at first glance has points in common with China asters, centaureas, and chicory. The heads are 3 or 4 in. across in cult. The marginal row of fls. is composed of about 15 ray-like corollas, which have a very short tube at the base and are much broadened at the apex and cut into 5 long, narrow strips.

The plant is hardy as far north as Rochester, New York, and Boston, Massachusetts. Probably many persons have been deterred from trying it because it is native to South Carolina and Georgia, and because it is considered a greenhouse subject in some standard works on gardening. The fact that it is found wild in wet pine-barrens is also deceptive, for the roots, as Woolson and Keller testify, will decay if water stands on the soil in winter. Moreover, the plant has been praised by Meehan for its drought-resisting qualities. Stokes' aster should be planted in a well-drained sandy loam, not in cold and heavy clay. It blooms from August until hard frost. According to Chapman, the heads of wild specimens are only an inch across, but the size of heads in cultivated plants is stated by many horticultural experts to be 3 to 4 inches across. The heads are

3699 Stokesia lævis. (×⅓)

frequently used for cut-flowers. In the wild the heads are few in a cluster or solitary; in cultivation a good branch sometimes bears as many as nine heads. No double form seems to have appeared but a white-flowered form is now on the market.

lævis, Hill (*S. cyánea*, L'Her.). Fig. 3699. Much-branched, hardy perennial herb, 1–2 ft. high: branches often purplish, sometimes hairy when young: lvs. lanceolate; radical ones entire, tapering at the base into long, flattened stalks; cauline lvs. gradually becoming sessile, the uppermost with a few teeth near the base and half-clasping: fls. blue or purplish blue, 3–4 in. across. Aug.–Oct. S. C., Ga., to La. B.M. 4966. Mn. 5, p. 214. A.G. 25:117. F.E. 16:650. G.M. 49:563. R.H. 1863:211. Var. **álba,** Hort., has white fls. Var. **præcox,** Hort., is a lavender-fld. sort. WILHELM MILLER.

STONECROP: *Sedum*.

STORAGE and refrigeration of fruits and vegetables. The storage house has become a very important adjunct to fruit-growing. In fact, fruit-growing would not be possible in present-day large-scale practice without storage, or some means to preserve the fruit from deterioration. Without some way to hold fruits in sound condition during the time required to transport them from the place of production, the development of the large fruit industries of the West and South would be impossible. The two most important factors underlying the success of modern fruit-growing are the discovery of methods of controlling insects and diseases and the application of refrigeration to the transportation and storage of the crops. The time required to transport fruit crops to the centers of consumption varies from a few hours to ten days, and in some cases two or three weeks are required, especially when the fruit is exported to foreign countries. Under these conditions, the trip to market really becomes a period

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of storage and the application of storage principles is as important as transportation principles. The object of refrigeration in the transportation of fruits involves only the holding of the fruit in sound condition long enough to reach the consumer. Storage, on the other hand, includes the holding of the product for a long or short period, thereby lengthening the season of marketing as well as increasing the territory over which it may be distributed. The lengthening of the season of marketing or period during which the product may be sold, is very essential when the production of fruit crops has reached a point greater than can be consumed during the normal season. This is aside from the general advantage of having a product out of season, for which many consumers are willing to pay fancy prices. The conservation of the surplus crops through storage enables the equalization of the selling or marketing season, giving the consumer the advantage of obtaining supplies during a longer period, and giving the producer a chance to market larger crops at profitable prices. The application of storage to the apple industry has resulted in making this fruit an all-the-year-round staple food, as supplies are easily held from one season to the next. The advantages of this to both consumer and producer are manifest. If all the apples produced had to go into consumption during the normal season of this fruit, there would be alternate periods of plenty and scarcity. The same is true, although to a less extent, of other fruit crops, such as pears, grapes, lemons, and oranges. Many of the vegetable crops are likewise held successfully in storage for longer marketing periods than their normal seasons. Potatoes, celery, cabbage, onions, and even lettuce and cauliflower are successfully stored for varying periods.

Storage also finds application in other horticultural industries. The nurserymen are enabled to hold their stocks of trees, plants, cions, or cuttings until the proper season of planting or propagation arrives. Bulbs, lily-of-the-valley crowns, and cut-flowers are also successfully held in cold or cool storage much longer than would otherwise be the case. All of these examples are mentioned to indicate the wide application of storage to horticultural industries.

There are several different methods of conserving or preserving food products. Among these methods may be mentioned curing, drying, salting, smoking, canning, use of chemical preservatives, and by refrigeration. Of these the last method is the only one by which the products are held in their original or "fresh" condition. All other methods involve a change in the character of the product. Cold-storage conservation aims to hold the product in such a condition that it may be used as fresh. If the storage does not accomplish this, it falls short of its principal object.

Two kinds or methods of storage are recognized at present: These are (1) cold storage, and (2) common storage, sometimes known as "dry storage." The objects of these two methods of storage and their accomplishment are the same. "Cold" storage is designated as artificially cooled storage, or the holding of the products in rooms or buildings which are artificially refrigerated, i. e., the cooling is effected by means of machinery or ice. "Common" storage is the term applied to storage without ice or mechanical refrigeration, the cooling effect being obtained from the natural low temperature of the outdoor air. The aim of common storage is "to conserve the natural cold" in buildings which are specially constructed and equipped with proper ventilating devices or openings. It is difficult to determine the exact reason for designating this type of storage as "dry" storage. Both cold and common storage must be dry, excessive moisture in either case being detrimental. A possible explanation of the use of the term "dry" in this connection is the fact that in the first cold-storage houses ice was the refrigerant with necessarily more or less dampness about the plant; while in common storage, no ice is used ordinarily and consequently there is no dampness from this cause.

Contrary to general belief, the use of cold storage is not confined to modern civilization. Frank N. Meyer, Agricultural Explorer for the United States Department of Agriculture, reports the finding of the use of cold-storage methods applied to fruits in remote parts of China, wholly out of touch with modern civilization. Meyer states that the Chinese have practised cold-storage methods for centuries. They are able to hold grapes from one year to the next by storing them in deep cellars which are kept cold with baskets of broken ice placed among the baskets of fruit. He found also that the Chinese fruit merchants keep perishable fruits in large thick-walled earthen jars, in the bottom of which a layer of broken ice is kept and over this, in wicker baskets, the fruit is held. The jar is covered by a wooden felt-covered lid. It is a long step from these ancient Chinese ice-cooled cellars and jars to the modern mechanically refrigerated storage house, but it is certainly of interest to find that the ancients understood the fundamental principles of the conservation of foods through the reduction of their temperature.

There has been much discussion during the past few years regarding the application of storage (cold or refrigerated storage principally) to the conservation of foods. It seems unfortunate that the bulk of this discussion has taken a rather condemnatory stand. The dangers of the use of cold-stored food products have been over-emphasized. The present high cost of living has been at least partly ascribed to the supposed pernicious practice of "cornering" foodstuffs during their normal seasons at low prices, and holding them in storage to be sold at arbitrarily high prices. While there is no doubt that attempts have been made to corner foodstuffs in this way, experience shows that these attempts have been few and almost uniformly disastrous financial failures so far as the promoters were concerned. As will be shown later in this article, the holding of fruits or other foods in storage is rather expensive and not so simple as it seems to be at first sight. Not all products are uniformly suitable for storage and unless the greatest care is exercised both in selecting the product and preparing it for storage, serious losses from deterioration are certain.

Another unfortunate fallacy, that cold-stored products are necessarily inferior as such, has become widely prevalent, due to campaigns in newspapers and magazines with a view mainly of casting odium upon stored products. There can be no doubt that much poor cold-stored food materials have been sold. Deteriorated foods have frequently been foisted upon consumers. The fallacy lies in attributing the deterioration alone to cold storage. Such deterioration can usually be traced to the poor condition of the product at the time it was placed in storage, to improper methods of preparing the product for storage, or to attempts to hold it too long. The application of the low temperature is not detrimental unless the temperature is low enough to injure the product by freezing. No product can be improved through cold storage. If it is in poor condition when it is placed in storage, it will be in much poorer condition when it is withdrawn. If it is in good condition at the time it is stored, it will remain in first-class condition throughout its normal life, provided always that the storage plants or rooms have been properly operated.

Many fallacious arguments have been offered tending to prove that holding in cold storage is itself sufficient to render a given food product unwholesome. While unwholesome cold-stored products have at times been placed on the market, as admitted in the preceding paragraph, the condition of the goods was due to the three causes above enumerated and not alone to the application of refrigeration. The attempts to hold supplies which have deteriorated before they are placed in

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storage are frequently responsible for untimely deterioration, and the practice should be discouraged; but so far as fruits and vegetables are concerned, it is perfectly safe to state that no injurious effects have ever followed the use of these cold-stored foods. The evidences of deterioration are plainly visible in fruits and vegetables and there are no hidden germs or ptomaines. No one is likely to be deceived into eating a deteriorated fruit or vegetable.

The agitation against cold-stored food products has resulted in a demand for legal regulation of the storage business. Several states have passed laws prescribing certain conditions which must be met. Attempts have been made to obtain federal regulation, and no doubt federal laws concerning the cold storage of foods will eventually be enacted. The state laws now in effect and the proposed federal legislation place arbitrary limits upon the time the products may be held; provision is also made regarding the marking of the products, and the inspection of the goods from time to time is provided. Legal regulation of this business is desirable and wise, but it is not wise to present arbitrary obstacles to the development of refrigeration. It is questionable whether the adoption of an arbitrary length of time for holding all products is wise or safe. Not only does the length of time vary for different classes of goods, but within the same class the condition of the product at the time it is placed in storage or its treatment previous to storage very materially influences the time the product may be held in wholesome condition. Thus, not all apples of a given variety may be held the same length of time. The length of the period of successful storage will depend upon the condition of the fruit, its stage of maturity, the care with which it has been handled, and also the promptness with which it has been cooled. The same principle holds true for all other fruit and vegetable products. It would seem, therefore, that some provision for the inspection of food products to determine their fitness for storage would be wise and would result in preventing many losses now sustained through the storage of unfit goods. So far, none of the laws passed or proposed makes this provision.

This argument is not offered to defend the cause of cold-storage warehousemen. They have not been entirely free from blame in the past. The possibilities and the advantages of cold storage should be fully appreciated by consumers and producers alike. The necessity for refrigeration in horticultural industries will undoubtedly become more and more urgent, and the use of this important adjunct to modern fruit-growing is bound to extend its scope and receive wider application in the future.

Cold storage is a modern economic necessity. Through this system of food conservation, the extension of markets and the territory over which different commodities may be distributed are very materially increased. In the use of cold storage or refrigeration, the first establishments depended on ice for the refrigerating medium. In the earliest plants natural ice was used. This was gathered or "harvested" during the winter and used during the spring and summer months. There is a very large quantity of natural ice used under modern conditions, but the manufacture of ice is increasing and the use of "artificial" ice is likewise extending, even in districts where natural ice may be obtained without difficulty.

Systems of refrigeration.

In modern cold-storage plants two systems of refrigeration are used: (1) ice refrigeration, and (2) mechanical refrigeration. There are several methods of applying each system. In the use of the first, ice alone may be the refrigerant, or a mixture of ice and salt may be used to obtain lower temperatures than are possible from ice alone. In the application of the ice-and-salt refrigerant, several systems may be used, as will be explained later. The ice used may be manufactured or natural, depending on the relative cost.

In the mechanically refrigerated plant, the refrigeration is secured directly without first producing ice. It is apparent that the direct application of the refrigeration results in a very material saving in both time and energy. In this way, the cumbersome method of first manufacturing the ice and the consequent inconvenience in handling it are avoided.

There are two kinds or styles of cold-storage plants—the general warehouse, provided with cold-storage equipment for handling all classes of commodities; and the storage plant constructed specially for the storage of a particular class of commodities—fruit or dairy products for example. It is evident that the large general warehouse may have a very great advantage in economy of operation. The general warehouse handles a mixed business which often results in a more economical distribution of overhead operating expenses than is possible when the entire burden of expense must be borne by a single commodity or single class of commodities. It is easy to see that the greatest efficiency and economy of operation occur where practically the entire capacity of the plant can be utilized during the year. This is hardly feasible with fruits, with the possible exception of apples which are now held largely during the greater part of the year. But even in the case of apples, there cannot be a full use of the equipment continuously, as the withdrawals will be gradual throughout the season. Nevertheless, the construction and operation of cold-storage plants for apples or other fruits is constantly increasing. These plants may be owned by special corporations or may be built and operated by growers' organizations or by growers who have sufficient acreage to warrant the extra provision of storage facilities. In some instances the ownership or control of cold-storage facilities has rendered fruit-growers independent of buyers' or speculators' manipulations of prices or marketing facilities.

Mechanical refrigeration depends on the compression of a gas or vapor. The compression exerted heats and, in some instances, liquefies the gas. The heat is absorbed by means of cooling water, and when the gas is allowed to expand, an equal number of heat units is absorbed from the surrounding medium. This, briefly, is the general principle upon which depends the operation of refrigeration machines. The gases used may be air, ammonia, sulfur dioxide or carbon dioxide, commonly known as carbonic-acid gas. In the cases of air machines, the air is simply compressed under very heavy pressure and cooled by means of water. There is no liquefaction of the air attempted in the case of these machines. The advantages of the air-compressors are that they are comparatively easy to manipulate and there are no injurious effects in case of leakage from the compressed vapor. These machines are used to a great extent on shipboard, and in England to a much greater extent than in the United States. Improvements in the construction of air-compressing machines are resulting in their increased use. The disadvantage of the air-refrigerating machines is that they are relatively inefficient for low temperatures. There being no liquefaction of the gas, the advantage of the latent heat due to the change of state is absent, and consequently there is a loss of efficiency to the extent of the latent heat necessary, first, to change the gas to the liquid and then back from the liquid to the gaseous state.

In the machines which utilize a liquefiable gas, that is, a gas which may be liquefied at comparatively high temperatures, the latent heat due to the change of state adds greatly to the efficiency of the machines, and consequently, much lower temperatures can be secured for a given amount of power. One of the essential qualities of the gas which may be used for this purpose

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is that it must be comparatively inexpensive and must be within the means of utilization by a comparatively simple apparatus. Ammonia, sulfur dioxide, and carbon dioxide are in general use in about the order named. Ammonia is the most common, and is in many respects the easiest to handle. It may be liquefied at a lower pressure and a higher temperature than either carbon dioxide or sulfur dioxide. Carbon dioxide is, therefore, somewhat less efficient to the extent that the high pressure requires more power, there is greater friction to overcome, and colder water is needed for condensation. These conditions are not always obtainable within ordinary means. Carbon dioxide has the advantage of being a non-irritating and non-poisonous gas. If leaks occur in the system, there is no great danger of serious injury either to the operators of the machinery or to the goods stored in the rooms. If leaks occur in the ammonia system or in the sulfur dioxide machines, there is very great danger of injury to the workmen about the plant and the food commodities exposed to these gases may be very seriously injured, even with a slight leakage. Nevertheless, the greater ease with which the ammonia machines can be manipulated is considered a sufficient advantage, and this type of machine is much the commonest now in use.

The system of operation of the refrigerating plant is comparatively simple although rather complicated machinery is required. It is not essential that the fruit-grower who contemplates the erection of a refrigerating plant be conversant with all of the complicated details. It is well, however, that he understand the principles upon which the machines are designed. For the erection and planning of a complete storage plant depending on refrigerating machinery, the services of a competent refrigeration engineer are essential. While it may be possible for a mechanically inclined fruit-grower to design and have erected a complete refrigerating plant, it must not be forgotten that slight errors in the calculation of the power required and the capacity of the machinery necessary to yield given results will frequently render the operation of the plant very much more expensive than need be, or the efficiency of the plant may be very seriously impaired. Refrigerating machinery is, of necessity, expensive; it is likewise delicate in many respects.

There are many styles and designs of refrigerating machines. All, however, are dependent upon the same general principles. There is, first of all, the motive power which may be either the gasoline or electric motor, or the steam engine, which furnishes the power to operate the compressor. The compressor exerts pressure on the gas, heating it to a rather high temperature. If the machine is operating with ammonia gas, the compression results in a dense hot vapor. From the compressor, this hot vapor passes to the condenser, which is a system of pipes arranged in such a way that streams of cooling water may be passed continuously around the pipes containing the hot gas. The absorption of the heat from the dense vapor condenses it into liquid ammonia. This liquid is ordinarily run into a receiver or reservoir, where it is kept for use as needed. From the receiver, the liquid ammonia is forced into what is known as expansion coils. These coils consist of series of pipes into which the liquid ammonia is allowed to enter. The liquid boils at a low temperature and changes from the liquid to the gaseous state, and in changing its state and expanding absorbs considerable heat from the surrounding medium; in this way the refrigeration is obtained. After expansion, the ammonia gas is passed back to the compressor where it is again compressed and afterwards liquefied, the same gas being used over and over again.

Instead of the compressor, the same effect can be obtained from what is known as the absorption system. This is a combination of a chemical and mechanical process. No compressor is used. Dense aqua-ammonia, which is simply a strong solution of ammonia gas in water, is heated in a reservoir, and as the ammonia escapes from the solution, it is under heavy pressure and becomes a dense vapor. From this tank the gas is passed through condensing coils and liquefied, just as is done in the compression system. After liquefaction, it is allowed to expand in coils and the gas is then returned to a tank or a series of tanks known as absorbers. These absorbers contain cool water which readily absorbs or dissolves the ammonia gas. From the absorber, the solution is pumped into the heating tank, again heated, and the process repeated.

When one contemplates the installation of refrigerating machinery, one of the most important factors to consider is the supply of water needed for condensing. This is ordinarily of very much greater importance than is appreciated. Large quantities of water are needed unless the temperature of the water is very low. The higher the temperature of the water-supply, the larger the quantity needed. The same water may be used continuously if there is some means at hand to cool it after it has served to absorb the heat from the condensing ammonia. In large refrigerating plants this is taken care of by means of large racks or towers located in some exposed place. In these towers, the water is run through screens which break it into many fine streams, thus increasing the evaporation and cooling the water by the absorption of its heat. Unless some means is at hand to cool the water, a constant supply must be provided; otherwise, the efficiency of the machinery will be very greatly reduced. This point is of the utmost importance when refrigerating plants are to be located in fruit-growing districts. In fact, the practicability of operating the refrigerating plant successfully depends primarily on the presence of a sufficient supply of water for condensation.

Ice systems.

Refrigeration may be obtained from the use of ice alone. In this instance, however, only cool-storage effects can be obtained, except in winter and in climates where the outdoor temperature is low enough to offset the lack of refrigerating effects from the ice. The minimum temperature obtainable from ice is its melting point, which is just above 32° F. or, under the very best conditions, about 33° or 34°. Generally, ice-cooled chambers cannot be maintained below a temperature of 38° or 40° and these temperatures are obtainable only under the most favorable conditions. To obtain a low temperature from ice, the addition of salt is necessary. The mixing of salt with the ice lowers the melting-point and, consequently, the temperature is lowered, although the rapidity with which the ice is consumed is very greatly increased. When the mixture of ice and salt is used, the quantity of ice necessary for storage is much greater. A lower temperature is necessary to hold the storage chambers at 32° F. because of the heat leakage into the chambers through the walls.

There are two methods of obtaining refrigeration from ice and salt. One of these is the indirect method, known as the gravity-brine system, and the other is the direct circulation of air through the ice and salt mixture.

The gravity-brine system, the invention of Madison Cooper, acts as the reverse of a hot-water heating system. It depends on the principle of the greater density of a cold liquid, and its consequent downward flow when confined in a system of pipes. The system consists, first of all, of coils of pipes filled with a strong solution of calcium chloride brine. One end of the pipe system is contained in a tank which holds ice and salt. The cooling effect of the ice and salt results in greatly reducing the temperature and increasing the density of the brine. From these "primary" coils the brine is conducted into what is known as secondary coils which are placed in the rooms or chambers to be cooled.

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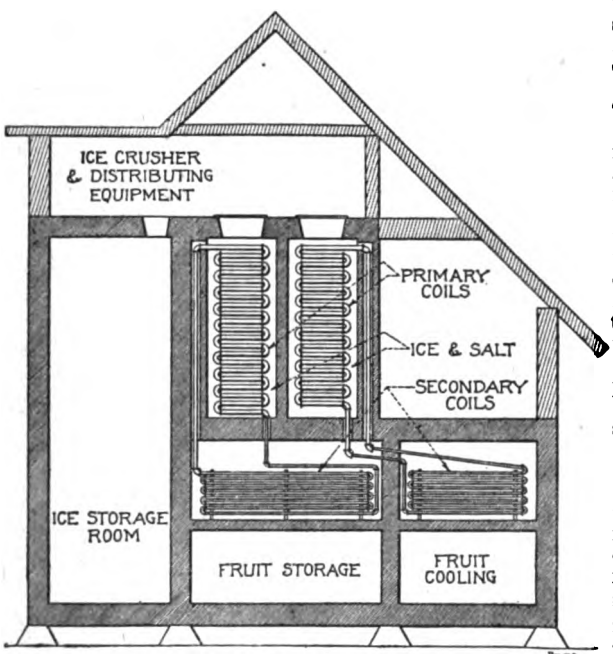
The cold brine passes through the secondary coils, and, as it absorbs the heat from the rooms or chambers, its density is decreased and it flows upward and is returned to the top or primary coils, where it is cooled and the process repeated. Fig. 3700 is a diagram illustrating the principle upon which the Cooper gravity-brine system depends. At the top of the illustration the primary coils are shown and the methods of placing the pipe systems or coils is indicated.

The cooling effects secured from the Cooper brine system are indirect in that the refrigeration obtained from the ice-and-salt mixture is first exerted upon the brine solution and this solution is the means of carrying the refrigeration to the place where it is needed. There is an inevitable loss in the indirect method because of the loss of refrigeration in the conducting pipes.

In the second system of securing refrigeration from ice and salt, the air is passed directly through the mixture and, consequently, the refrigerating effect is obtained directly from the mixture. Experiments



3700. Diagram of Cooper gravity-brine system.

have shown that very low temperatures can be obtained by passing a current of air through an ice-and-salt mixture, the temperature depending on the proportion of salt used in the mixture. The higher the percentage of salt the lower the temperature obtainable. The device for obtaining refrigeration in this way is simple. It consists of a tank for holding the crushed ice and salt. At the bottom of this tank openings are provided through which a current of air can be forced. The particular working out of the design for obtaining refrigeration in this way has been accomplished by S. J. Dennis, of the United States Department of Agriculture. Dennis' apparatus has been used successfully in several plants on the Pacific coast, and owing to the fact that it was developed as a part of the Departmental investigations, its use by the citizens of the country is free. It is essentially an ice-and-salt tank of "magazine" type. As the ice is melted at the bottom the supply from above drops down. From 7 to 10 per cent salt has been found to yield satisfactory temperatures. The apparatus can be constructed by almost any ordinary mechanic who can follow detailed drawings or instructions. A fan is used to draw the air through the ice-and-salt mixture and to force the refrigerated air into the storage chambers. Ducts are provided for the return of the air, and in this way the same air is used continuously.

There is another method of securing refrigeration from ice and salt which may be designated as the "tube system." In this system the mixture of ice and salt is contained in tubes located at the sides of the room. The tubes are filled with the mixture from the top and the refrigeration is obtained by the cooling of the air in contact with the tubes. The number of tubes necessary to cool a given quantity of goods depends upon the character, size, and insulation of the room. The tubes are constructed of galvanized iron and are about 8 or 10 inches in diameter. The tops of the tubes open above the storage room, so that the filling can be done without opening the room itself. A proper arrangement of pipes at the bottom to carry off the meltage is necessary, and in arranging for this meltage outlet, a proper trap must be provided in order to prevent the wastage of the cold air. This system has found considerable application in the Hudson River Valley of New York state, and is very effective for a short season of storage.

Systems of applying refrigeration.

Refrigeration may be defined as the cold obtained from a refrigerating medium or directly from mechanical appliances. The temperature-reducing properties of the ice-and-salt mixture and those of the liquid ammonia are the refrigerating qualities of these agencies. Refrigeration is ordinarily measured in terms of ice-melting capacity in a day of twenty-four hours. For example, a machine which is rated as yielding a capacity of ten tons a day is based upon the meltage of ten tons of ice in that time. Ordinarily, it is not the quantity of ice which can actually be produced by the machine, except when ice manufacture is the primary object.

There are three systems of applying the refrigeration secured by mechanical means: (*a*) direct expansion; (*b*) brine circulation; (*c*) air circulation.

In the direct-expansion system, the expansion pipes in which the gas is allowed to expand, and thereby produce the refrigeration, are located in the storage rooms. The claims for this system are that the work is direct; therefore there is no loss in conducting the refrigeration obtained from the pipe surface. The greatest objection to this system, especially with ammonia or sulfur dioxide plants, is the danger of leaks. Small leaks may allow a sufficient quantity of gas to escape to damage the goods stored in the rooms; there is also great danger to the workmen, which has already been referred to. The greatest care is necessary in constructing the direct-expansion system. With the perfection of mechanical devices for welding and fastening pipes, the danger from leaks has been reduced to a minimum, and there are many direct-expansion systems in operation in which no injuries have ever been recorded. One disadvantage is the fact that there is no reserve power except that which is contained in the liquid receivers. Should it be necessary to shut down the machinery for repairs for any considerable length of time, there would not be sufficient reserve to continue the refrigerating effects and the temperature of the storage rooms would be likely to rise to a considerable extent.

In the brine-circulation system, the expansion coils are surrounded by a non-congealable brine such as a solution of calcium chloride, which has a very low freezing-point. The brine is cooled in the pipes and this cold brine is circulated through coils in the rooms by means of pumps. In applying this method, there is, first, what is known as a brine-cooler in which the actual cooling of the brine takes place; the cold brine is then

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collected in a brine tank of sufficient capacity to operate the plant for a considerable length of time. This really acts as a reservoir of cold, and from this reservoir the cold brine is circulated throughout the entire cold-storage plant, the temperature and quantity of the brine circulated being governed by the results desired.

The coils of pipes in the rooms are commonly referred to as the "piping." These coils or racks of pipes are the room's equipment for refrigeration, and the number of coils or length of piping depends upon the size of the room and the temperature desired. Low-temperature rooms or freezers have a large number of coils and a great length of pipes. Pre-cooling rooms should also have heavy piping and many pipes. The advantages of the brine-circulation system are that there is no danger from leakage of ammonia or other irritating gas. The statement is also made that there is a more uniform temperature, the flow of the brine being under constant and easy control. The temperature of the brine is also under definite control. Perhaps the greatest advantage is that the supply of cold brine acts as a reservoir of refrigeration and a reserve supply can be drawn upon in case of necessary shutting down of the machinery.

In placing the pipes in cold-storage chambers, it is important to have them located at the upper part of the room. Ordinarily, the dependence for the circulation of refrigeration throughout the room is on the natural circulation of the air within the room. The air in contact with the pipes is cooled and, being rendered more dense, flows to the floor, the warmer air from other parts of the room taking its place. In this way, a constant circulation throughout the room is maintained. It is easy to see, therefore, that the placing of the pipes in the upper part of the rooms is essential; otherwise, there is danger that the parts of the room above the pipes may be beyond the refrigerating effects. The air is, therefore, the medium of applying the refrigeration. It is due to convection currents that the transfer from the refrigerating pipes is effected, and it is very difficult to obtain a uniform cooling in all parts of the room unless the pipes are carefully placed.

In the air-circulation system of applying refrigeration, there is a forced air circulation. The air is forced through conduits or ducts by means of fans. In this system the expansion coils of pipes are in groups or batteries in what are known as bunker rooms, or more correctly, coil rooms. The refrigerating capacity of the plant is, therefore, concentrated in one place. In arranging the coil pipes, baffles are placed in such a way that the air passing through the coil rooms must come in contact with all of the pipes. If all of the pipe surfaces are not reached by the air, the full refrigerating effect of the plant is not obtained. The coils may be direct-expansion coils or brine-circulating coils, that is, have the brine circulating through them. The Cooper gravity-brine system may also be used. For this purpose, the secondary coils are located in coil rooms where the air to be cooled can be forced through.

In placing the fans for such a plant, the arrangement must be such that the air is drawn from the coil room and forced through ducts to the storage chambers. With this arrangement there is a constant pressure in the rooms which is preferable to the exhaustion of the air. Any leakage which occurs, therefore, is outward from the room instead of inward. Return ducts are provided which conduct the air back to the coil rooms, the same air being used continuously. Impurities from the storage rooms are absorbed by the air and deposited in the moisture which freezes on the cold pipes. The impurities, therefore, are very largely absorbed by the frost, and the circulation of the current of air through the coil rooms acts largely as a purifier of the air of the storage rooms. Some ventilation, however, is frequently desirable. The problem of ventilating a cold-storage chamber is a difficult one and special appliances must be provided for this purpose. The outer air cannot be admitted directly into the storage chamber unless it is at the same temperature as the air of the storage room. In warm weather, therefore, the admitted air must be cooled and in extremely cold weather it must be warmed. There are special mechanical devices for accomplishing both of these purposes.

Shape of storage plants.

Many storage plants are planned without consideration of the factor of the most economic shape; that is, the most efficient as well as the most economical size of plant to be constructed. The first consideration is that the plant should be planned to supply the required floor space and cubical capacity. In figuring the size of storage rooms to accommodate packages of fruits, the size of the fruit packages must be taken into consideration and enough space must be made to allow the air to circulate between the stacks or bales of packages. A barrel of apples, for example, requires 8 to 10 cubic feet. Another factor which must be considered is the economical handling of the packages in the storage rooms. Where the storage season is comparatively short, the extra expense of piling in high stacks must be considered. Where, however, the storage season is to be long, higher stacks may be made and, consequently, rooms of greater height will be most economical. After the size and the cubical contents of the chamber are determined, the next consideration is the shape of the plant or room.

The most economical shape for a storage plant is the cube. This is due to the fact that the ratio between cubical contents and exposed outside surface is smaller for the cube than for any other shape. It is important to take this into consideration because of the fact that there is no perfect insulating material and, consequently, when the ratio of exposed outside surface is very high, the rate of heat leakage into the room is increased considerably when the shape of the room differs materially from the cube. Such a room must have either much heavier insulation or considerably more power must be supplied to offset the greater heat leakage. Sometimes limitations of space, as for example, utilizing parts of buildings, require that the rooms be of odd shapes. When this is necessary, it will require considerably more insulation or power, as suggested. The capacity of the plant must be determined by the nature of the commodity to be stored. Large rooms are easier to maintain at a desired temperature after the entire load of the room is reduced to the required temperature. In large rooms, however, it is more difficult to cool uniformly unless some special attention is given to the placing of the pipes, or the duct openings where forced air circulation is used. For periods of short storage, such, for example, as the more perishable fruits like berries, rooms of smaller capacity are more desirable than very large rooms.

Insulation.

There are three ways in which heat may be transferred: radiation, conduction, and convection. Radiation is the transference of heat from one body to another through a third medium without perceptibly affecting the medium. The heat which one feels when standing before a fire is radiant heat. The conduction of heat is accomplished by the passing of heat from one body to another by contact with the heated body. The heat that one feels when the hand is placed on a warm pipe is conducted heat. Heat is transferred by convection by means of a third medium, usually air. In attempting the construction of storage houses, all three methods of heat transference must be taken into consideration. The heat actually radiated is comparatively small in storage buildings. The quantity of heat transferred by conduction is greater, but the most

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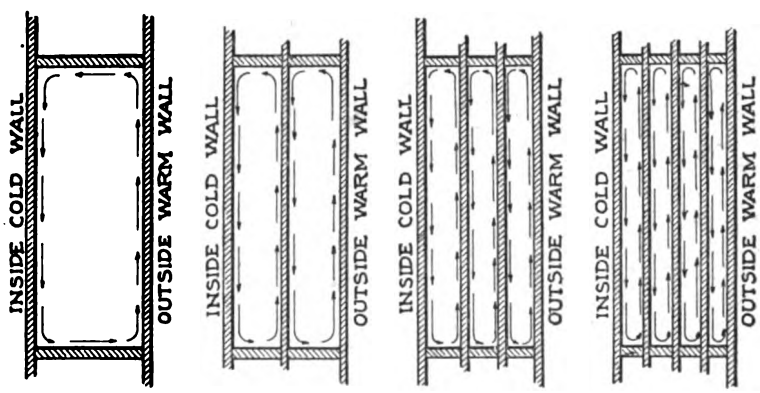
important problem of heat transference is through convection currents. In order to offset this heat transference, specially constructed walls must be provided. A storage chamber is a room so constructed that the temperature may be maintained at or near a constant point. In order to offset changes of temperature, sufficient refrigerating capacity must be provided, or some means to prevent the actual transmission of the heat from the outside to the inside of the room. The latter provision is known as the insulation of storage rooms. Therefore, the rooms are constructed in such a way that the walls act as barriers against the transmission of outside heat into the room, or the loss of heat of the storage room to the outside in extremely cold weather. The best insulation against heat transmission is a vacuum. If it were possible to surround storage rooms with vacuum walls, the heat leakage into the room would be very slight, and after the rooms were once cooled to the desired point, it would not require machinery of great capacity to maintain a low temperature. It has been found difficult, however, to maintain a vacuum under ordinary circumstances. The outer air pressure is constant and leakage of air into the vacuum walls, although slight, gradually destroys the insulating effect. Attempts at vacuum construction on a large scale have not been successful.

Air spaces, that is, walls made air-tight so that the air is closely confined, have been thought to be efficient insulation. Still air is a necessity where this method of insulating the wall is used. A slight leakage into the wall is sufficient to allow outer air to enter and, consequently, to destroy the insulating effects. In walls constructed of free air spaces, convection currents occur within the spaces, which act as effective transferers of heat either inward or outward, as the case may be. Fig. 3701 shows the action of convection currents within air spaces. When one air space is used, the transfer of the heat is very easily accomplished, as shown by the direction of the air currents—shown by the arrows in the diagram. Simply thickening the walls, therefore, does not act as a sufficient insulation. The insulating effect of air spaces is considerably improved by breaking up the walls into smaller air spaces. The diagram shows the convection currents occurring in walls of one, two, three, or four air spaces. As the number of spaces is increased, the effect of convection is very greatly reduced, so that a wall consisting of four air-tight spaces may be considered as fairly efficiently insulated. It is, however, extremely expensive to construct these air-tight divisions, and some other means of insulation is desirable.



3701. Diagrams illustrating convection currents in walls consisting of one to four dead-air spaces.

It is preferable to use some material to fill the walls. Such a filler breaks up the air spaces within the walls and confines the air in the small interstices between the particles. In this way, the air held within the wall approaches more nearly the desirable "dead-air" condition. Convection currents actually occur in filled walls, but they are very sluggish and the effect is very slight. Filled walls are effective barriers against heat conduction or radiation, provided, of course, that poor conductors of heat are used.

The most effective insulating material is a substance of low-heat conductivity which has many pores or cells. These cells are filled with air (practically still air); consequently the efficiency of the heat barrier is increased. A number of substances are effective as insulation for storage walls. The requirements for an insulating material, besides non-conductivity of heat, are as follows:

1. Odorless; any strong odor would affect the goods stored in the rooms.
2. Moisture-proof or low capacity for moisture; dampness decreases the efficiency as an insulating material, and some substances ferment or rot when damp.
3. Vermin-proof; there should be no inducement for rats or mice to nest in the walls.
4. Non-liability to inherent disintegration or spontaneous combustion.
5. Lightness in weight; not only on account of the reduction of the actual weight of the walls, but because light materials are usually the best non-conductors of heat.
6. Elasticity; when packed firmly in the walls the material should not settle, as any settling within the walls results in open spaces in the insulation. After the walls are once constructed, these inequalities cannot be reached for repairs without completely rebuilding the walls.
7. Relative cheapness and economical handling; the material should not be so high in cost as to be prohibitive. In addition, the material must not be of such a nature that its economical handling is impracticable.
8. Must allow of practical application in general work; very specialized material which would not lend itself to general conditions could not be considered as efficient insulating material.

The list of materials available for insulation may be divided into two classes: Those that can be considered as commercial insulation—that is, materials which are manufactured especially for insulating purposes; and common or waste materials.

Among the most common of the first class are the following: granulated cork, cork sheets or boards or bricks, hairfelt, linofelt, mineral wool, and lith.

Granulated cork is considered to be one of the best and most effective insulating materials. It is prepared from the trimmings of cork mills, and when used in the granulated state is simply filled into the walls and packed tightly. Cork sheets, bricks, or boards are manufactured of the cork particles which are compressed in molds at a high temperature. There is no cementing material used, the heat and pressure being sufficient to liquefy the natural gums and resins of the cork and these hold the particles together. Cork boards or sheets are also made by the addition of asphaltum pitch which renders the particles water-proof but may decrease the insulating efficiency.

Hairfelt is manufactured of waste cattle hair which is washed and deodorized. It is pressed or felted together by special machinery into sheets from ¼ to 1 inch in thickness.

Linofelt is a patented material manufactured from

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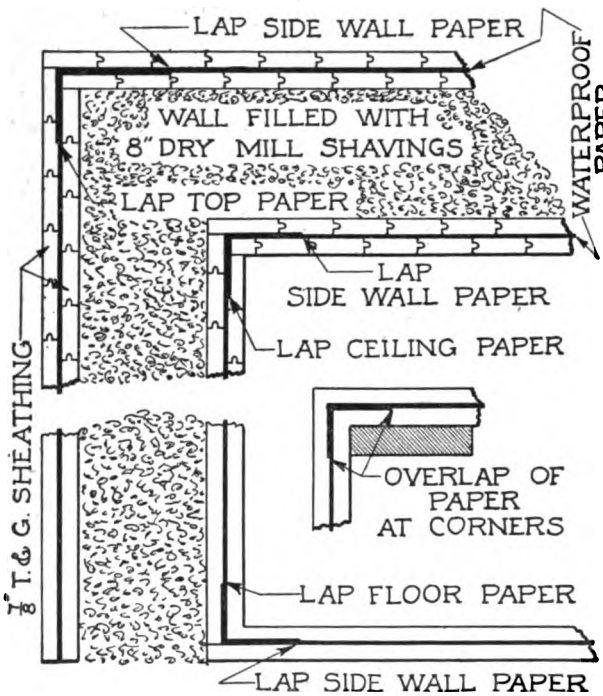
flax fibers. It is prepared in sheets or quilts, from ¼ to ½ inch thick, somewhat like cotton-batting. These sheets are ordinarily quilted between water-proof paper. This material is used largely for insulating household refrigerators and refrigerator cars.

Mineral wool is also known as rock-wool, rock-cotton, rock-cork, or silicate cotton. This material is usually made from the slag of blast furnaces with the addition of limestone. Rock-wool is usually made from



3702. Diagram showing proper construction of wall insulated with mill shavings.

a mixture of granite particles and limestone. The crushed rock is mixed with coke and fused in furnaces at a temperature of about 3,000° F.; the molten slag or rock is run out through the bottom of the furnace by a high-pressure steam blast. This blows the slag into very fine shreds or fibers, much resembling fleece or wool. The result is a material which contains from 92 to 96 per cent air spaces and, although consisting primarily of a substance of high-heat conductivity, is fairly efficient as insulation. It is practically vermin-proof, fire-proof, and not liable to decay. It absorbs moisture very easily, and one of the greatest disadvantages is the difficulty of handling. The fibers are very penetrating and are glass-like, which result in considerable inconvenience in handling the material.

Lith is a manufactured insulation composed of flax fibers, lime rock-wool, and water-proofing compound. It is prepared in boards of standard sizes and thicknesses and is accepted as a standard insulation by refrigerating engineers. It is a very efficient insulating material.

Common forms of insulating material which are usually at hand or can be easily obtained for the construction of storage buildings are: straw, chaff, hay, dry grass, dry leaves, hulls of various grains, sawdust, and mill shavings.

All except sawdust and mill shavings can be considered as suitable only for temporary structures. These materials are all fairly efficient as non-conductors of heat provided they are dry and means are used to keep them in a dry condition after being built into the walls. There is also some danger from the depredations of rats, and the greatest possible care must be used to prevent these rodents from gaining entrance. Sawdust from different woods has about the same insulating effect. The sawdust must be thoroughly dried, otherwise its efficiency as insulation is very greatly impaired and, in addition, there is danger of fermentation and heating, and even spontaneous combustion. It is more difficult to obtain dry sawdust than mill shavings, and whenever sawdust is used it should be very carefully dried before being placed in the walls. It has not as great elasticity as mill shavings and, consequently, is likely to settle after packing unless very carefully pressed into place.

Mill shavings consist of small chips and shavings from planing mills. This material has largely replaced sawdust for insulating purposes and is much more effective. It is obtained easily in a dry condition, owing to the fact that the mills of this kind usually work dry lumber. It is much more elastic than sawdust and does not pack or settle down. If thoroughly dry, and means are taken to keep it so, it is a very efficient insulating material and will remain in good condition for many years. It should be packed in the walls at the rate of eight or nine pounds to a cubic foot.

Whenever walls are filled with insulating material in loose condition, much will depend upon the method of constructing the walls. Not only is it necessary to use the lumber and insulating material in a dry condition, but unless the walls are properly built, the insulation will not remain dry any great length of time. Walls that are not practically air-tight allow the outside air to gain entrance and to mix with particles of insulating material; condensation of moisture takes place, and the insulating efficiency of the material is seriously impaired. The conditions for the condensation of moisture upon the insulation particles are ideal unless special means are used to prevent it. Contact with the inside walls lowers the temperature of the insulation to such an extent that when the warmer air from outside comes into contact with it, the moisture is deposited and absorbed. Therefore, it is necessary to build the walls in such a way that they will be practically air-tight. This is accomplished by having layers of elastic water-proof paper on the outside and inside of the walls. The proper method of constructing such walls is shown in Fig. 3702. The wall consists of two layers of matched boards on each side, between which the water-proof paper is placed. The figure also shows the proper method of overlapping the paper at the corners. It is very essential that these details be attended to; it is also necessary to prevent the tearing or breaking of the paper when placing it, and for this reason only elastic paper should be used. The more brittle forms of paper are so easily broken that it is almost impossible to place them without seriously injuring them. Any breaks at the corners or tears in the paper will allow considerable air leakage into the walls and very seriously impair their efficiency. This is probably one of the most important details in the construction of storage houses, both for cold-storage and for common-storage purposes. Too great stress, therefore, cannot be placed on this point.

Storage temperatures; humidity.

The general principles governing the application of low temperatures to the preservation of fruit products depend primarily on the fact that temperature is the most important factor governing the life activities of these products. A fruit or vegetable is a living organism in which the functions or life processes are continually proceeding as long as the body remains in a normal condition. The various processes of ripening depend upon the chemical and physiological changes within the

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organism. Contrary to common belief, the life processes do not cease when the fruit is removed from the parent plant. These processes continue until the life cycle of the organism is completed. The fruit organisms respire and transpire just as plants do and the measurement of the end products of these respiration and transpiration processes serves as an index of the rate at which the life activities are proceeding. Definite measurements on a large scale show that the temperature factor is the most important from the standpoint of the rate at which the life activities proceed. Each fruit organism has a definite life span or life cycle, and it is easy to see that if in any way these activities can be retarded, the life span can be lengthened. The reduction of the temperature of the organism materially reduces the life processes, and the rates at which these activities proceed is slackened to such an extent that the definite life functions of the organism may continue slowly during a long period. The retardation of the life activities through the reduction of the temperature thus induces a slowness of the rate and a consequent increase of the length of the life span. This is the essential physiological principle upon which the cold storage and common storage of fruits depend.

The most satisfactory temperature for storage purposes is one which is low enough to reduce the life activities to a minimum but not sufficiently low to stop them entirely. It is important to remember that a complete stoppage of the life functions of a fruit organism means the death of it, and when this occurs, the fruit soon thereafter becomes unfit for food.

Much careful investigation remains to determine the most satisfactory temperatures for various fruit products. Many factors are involved. One of the most important of these is the condition of the product when it is placed in storage. Fruits of the same kind and even of the same variety may have different storage qualities and require different storage treatments, depending upon the place where the fruit is grown or its previous handling. Until these factors are all known and controlled, it is unsafe to say that any particular temperature is exactly correct for all fruits. For this reason, it is difficult to limit storage periods by law, because no arbitrary limit can be satisfactory for all fruits. It would not be safe, for example, to state that apples should not be kept longer than a certain length of time. The same is true of pears, but with this fruit the conditions are even more extreme. Different varieties of apples and pears may be held in storage different lengths of time, and all warehousemen know by experience that the same varieties of fruits produced in different districts or in different seasons have different storage qualities.

The proper storage temperature for a fruit should be the lowest possible—that is, the lowest temperature at which the fruit can be held without actual injury. This is due to the fact that when other conditions are satisfactory, the lower it is possible to hold a given product the longer it will remain in good condition. This means, then, that the freezing point of the fruit can be safely approached under ordinary conditions. There are, naturally, some important exceptions to this general rule.

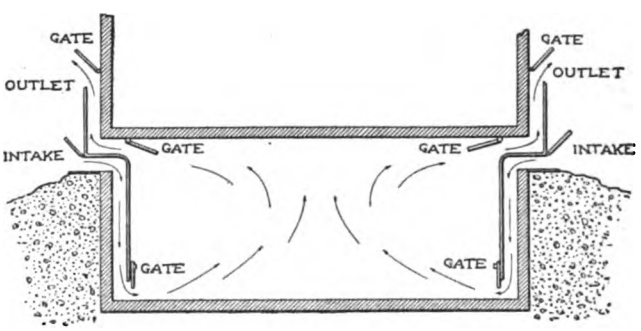
As has been indicated above, different fruits have different rates of life activities, and the more perishable fruits are those that have the most rapid rate. For example, perishable fruits like berries, peaches, and some varieties of grapes have very rapid life activities, while the less perishable fruits such as apples, pears, and the citrous fruits have a very low rate of life activities. This condition affects the storage period of a given fruit even under the most satisfactory condition. It is a well-known fact that the more perishable soft fruits cannot be held in storage for any great length of time. The naturally short life can be lengthened considerably but not to the same extent that the life span of the hardier fruits can be lengthened.

Berries of various kinds, cherries and cranberries, may be hard frozen and held in such condition for several months when the product is intended for use in making sauce or pies. When the hard-frozen fruits are removed from storage they must be used immediately, as they soon become soft and break down physiologically.

The most desirable cold-storage temperature for a fruit, according to present knowledge of the subject, is 32° F. for apples, pears, peaches, plums, strawberries, raspberries, loganberries, blackberries (short time), cherries, grapes, mangoes, celery, lettuce (short time). An apparent exception is in the case of apples from the middle coast section of California. The apples produced in this section require a somewhat higher storage temperature, due to the fact that a peculiar discoloration of the flesh develops when this fruit is held at the standard 32° temperature. This fruit is more safely held at about 35°. The varieties which are affected by this trouble are principally Yellow Newtown, Missouri Pippin, and, to a less extent, Yellow Bellflower. This apparent storage weakness seems to be confined to the mid-coastal district; apples from the mountains and other districts of the Pacific coast seem to possess normal storage qualities.

For potatoes, 35° to 40° F., for citrous fruits, 45° to 50° F., are the most satisfactory temperatures. Citrous fruits seem to be an exception to the general rule that fruits of low life activities can be held at temperatures near their freezing-point. Investigations show that temperatures below 45° F. are injurious to citrous fruits, except for a very short period. The low temperature seems to affect the skin of the fruit, inducing the deterioration by scald or stains and the development of various fungous diseases. At a temperature of 45° to 50°, or a common-storage temperature of 50° to 60°, citrous fruits may be held for several months without serious deterioration, provided means are taken to prevent shriveling. Lemons are sometimes held from four to six months at common-storage temperatures without serious deterioration, when humidity conditions are carefully attended to.

The proper humidity of the air of storage rooms is an important factor. Very little investigation of this important problem has been undertaken and, consequently, the fundamental factors governing the general principles of humidity conditions in storage rooms have not been definitely determined. Much shriveling of fruits in cold storage has been due largely to excessive evaporation on account of the free transpiration activities of the fruits. Transpiration, or the giving-off of moisture, occurs freely at high temperatures, less freely at low temperatures. The moisture, however, is being constantly given off even at low temperatures



3703. Diagram showing proper method of ventilating a storage cellar.

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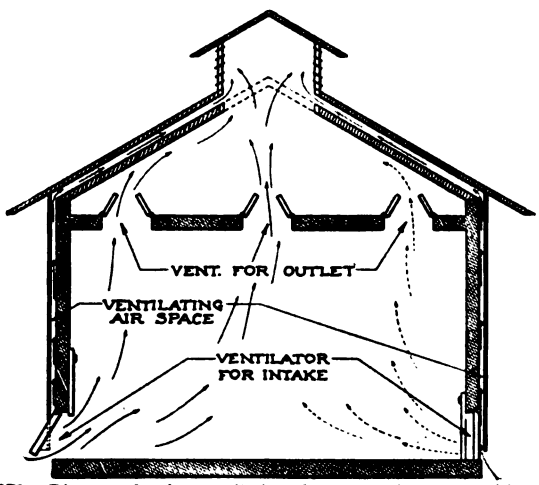
and when the air of the storage rooms becomes excessively dry, the fruit may become seriously wilted by excessive evaporation. The reduction of the temperature of the air reduces its water-holding capacity; consequently, as the air temperature is reduced to the freezing-point or below, all the excess moisture is removed and the air becomes saturated with water vapor for the temperature at which it is held. The total volume of water vapor is thereby greatly reduced. When the temperature of the air rises without the addition of moisture, its capacity for absorbing moisture from the fruit increases and, consequently, the drying effects due to refrigeration may be seriously overdone. The most satisfactory humidity condition in the storage room has never been correctly determined. Experience shows that the humidity condition should be as high as possible to prevent shrinkage from evaporation, but without danger from excessive moisture, which may induce the growth of mold.

Excessive wilting of fruits in storage is not always due to evaporation. Fruits which are picked in an immature condition wilt and shrivel seriously under the most satisfactory storage conditions.



3704. Diagram showing ventilating air space and proper positions of ventilators in a common fruit storage house.

From what has been said, it will be seen that humidity conditions in artificially refrigerated chambers very largely take care of themselves, due to the ameliorating effects of the refrigeration of the air. The control of the conditions becomes more important at high storage temperatures, e. g., it is very important in the storing of citrous fruits without artificial refrigeration. Under these conditions the humidity of the storage rooms or cellars must be held relatively high, because the higher temperature has a decided effect upon the life activities of the fruits, and a correspondingly high humidity is, therefore, essential. The fruit must be very carefully watched; otherwise, mold will occur when humidity conditions are too high. A relative humidity of about 80 to 85 per cent at a temperature of 50° F. has been found to be most satisfactory under the conditions which exist in California lemon-storage houses. It would not be safe to say that this humidity percentage is exactly correct, because the complexity of accurately measuring humidity conditions under different temperature conditions renders the problem very difficult.

Common storage.

The difference between common storage and cold storage has been explained (page 3246). The principal difference is that with cold storage, artificial refrigeration is used while in common storage there is no artificial refrigeration. Common storage is sometimes referred to as "dry storage," inferring that cold storage must necessarily be wet. This assumption is incorrect; cold storage is not in any way connected with moisture nor is it more likely to produce moisture in storage rooms, provided they are carefully conducted, than is common storage. Any excess of moisture in the cold-storage room means some defect in the construction of the plant or in its operation. It has been said that cold-stored fruits are more moist when withdrawn from storage than common-stored fruits. Here again, the difference is due to the difference in the temperature. The cold fruit from the artificially cooled storage chamber, coming in contact with the warm moist air, will condense moisture on its surface. Fruits from the ordinary storage rooms may not be cold enough to condense moisture; hence, the assumption that the cold-stored fruit is more moist than that from common storage.

Common storage is not practicable for all fruits. The very active or highly perishable fruits cannot be held satisfactorily under common-storage conditions because there are no ready means at hand to cool them to the desired temperatures. Citrous fruits are eminently adapted for common storage. The curing of lemons is really a process of common storage. Winter varieties of apples and pears are also suitable for common storage. This method of storage is used to a considerable extent in New York and is coming into wide use in the Pacific Northwest. In the operation of common-storage rooms, dependence is placed on the ventilation for the cooling. There is a vast difference between ventilation due to the actual change of air by the opening of windows or flues into the room and the circulation of air. Ventilation means the admission of outer air, and circulation may refer merely to the movement of the air within the room or plant, the same air being used over and over again. This distinction is necessary because frequently the circulation of the air within the room is designated as ventilation.

In the operation of common-storage rooms, the rooms are ventilated, or outside air is admitted, when its temperature is low enough to cool the fruit. The ventilators are closed during the day and during warm periods, thus conserving to a certain extent the low temperature obtained through the low-temperature outside air. It is essential, therefore, that there be cold nights or cold weather; otherwise, common-storage plants become mere cool-storage chambers, and the storage season is considerably shortened, due to the fact that the relatively high temperatures result in a high rate of life activities in the stored products. When the temperature of the common-storage room can be maintained somewhere near 32° early in the season there is no apparent reason why the storage period should not be extended to almost the same length of time that can be obtained under cold-storage conditions.

In the early part of the season, especially when there are few cold nights, it is difficult to reduce the temperature of the fruit to the desired point. This is the critical period, as the rapidity with which the temperature of the fruit can be reduced determines the length of time the fruit may be held in good condition. It is easy to see, therefore, that under common-storage conditions, usually the fruit must remain at a comparatively high temperature for a considerable length of time. The ripening which occurs during this period of high temperature cannot be offset by low temperatures later on. The developments which take place in this period of high temperature shorten the life span under storage conditions, and when the temperature is high and the fruit held warm for a considerable length of time, the storage period may be very materially shortened. There are frequent warm spells during the fruit harvest, and the nights are not so cold.

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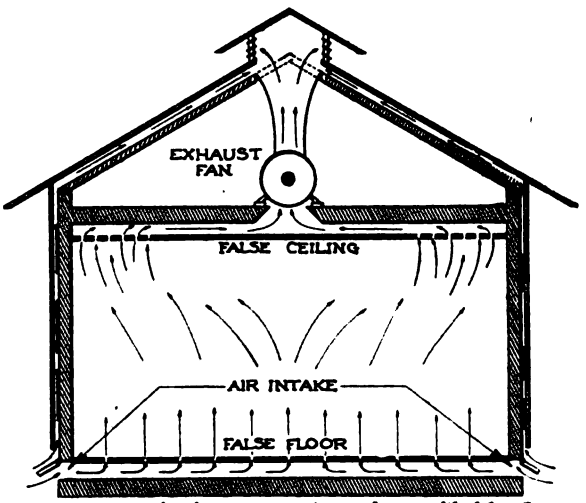
There is a widespread notion that common-stored fruits are better than cold-stored. It is difficult to understand how this opinion has become so fixed in the minds of many persons. It is probable that one reason is the fact that a comparison of fruit from common storage and from cold storage is really a comparison of fruits held under different conditions. The common-stored fruit is usually withdrawn after a shorter period and, therefore, may be in good condition. The cold-stored fruits are usually held for a long period and frequently the period is too long for the best condition of the product. Many carefully planned experiments show conclusively that cold-stored fruit remains in better condition during a longer period and, when carefully handled, remains in better condition after withdrawal than common-stored fruit. If the fruit is promptly and rapidly cooled at the beginning of the storage period, its life activities will be retarded to such an extent that the life span will be very materially increased. If this can be done under common storage, there is no reason why the fruit cannot be held in good condition. Frequently the fruit is placed in common storage during the fall and early winter; frequently also the common-storage room where the fruit is held is only a makeshift. After being held in this unsatisfactory condition for a time, the fruit is placed in cold storage later in the season when market conditions have not been favorable. This is the wrong way to store fruit. The time when cold storage is most urgently needed is at the beginning of the storage period, in order that the fruit may be promptly cooled. It would be more reasonable to remove the fruit from cold to common storage later in the season, because common-storage rooms may then be held in a satisfactory condition and the fruit would be in a much better condition for holding.

It has been suggested that a combination of cold and common storage is really the solution of many of the problems of successfully holding the fruit in the district where it is produced. Where ice can be obtained at a reasonable price, it can be used at the early part of the storage season to cool the fruit promptly and quickly. After weather conditions are such that cool nights prevail, the place can be operated as an ordinary common-storage plant for the remainder of the season.

Common-storage buildings.

The earliest form of common-storage buildings for fruits was caves or pits. These were used for the storage of fruits under the impression that the earth is cool and also to protect the fruit from freezing in extreme winter weather. The earth is cooler than the outside air in summer; in winter it is warmer, under ordinary conditions. Ordinarily, the temperatures of the ground range from 50° to 60° and this temperature remains fairly uniform below the frost line which, of course, varies materially under different climatic conditions. The protection against freezing in winter, therefore, is ideal, but unless some artificial method of cooling the room is at hand, the temperature of the earth itself is too high for best storage conditions. In the later development of the cave storage, ice was used to cool the chambers; this was naturally not satisfactory, due to the dampness and to the difficulty of ventilating.

Cellars have been a favorite place for common storage. They are open to the same objection as caves. Unless specially constructed and special means be provided for ventilation, the cellar is not an efficient fruit-storage chamber, except for short periods of time and for the protection of the products against freezing in winter. Cellars are difficult to ventilate unless special appliances are used. They may be ventilated by means of flues but the efficiency of such conduits is dependent upon differences in temperature, otherwise there will not be any appreciable movement of the air. Wind flues may be used; these are flues which have a funnel-like arrangement at the top, so designed that the mouth of the funnel is kept to the wind by means of a vane. The pressure of the wind entering the funnel creates a circulation of air through the cellar. In some instances these wind flues are found to work the reverse way during periods when the wind does not blow. In ventilating a cellar, there must be an outlet opening corresponding to the inlet opening. This is to allow the escape of the warm or foul air from the room. If it is possible to provide openings on all sides of the cellar, a current of air can be easily circulated through the room, especially if there is a breeze. The intake flues should open near the floor of the cellar. Fig. 3703 shows the proper placing of the inlets and outlets designed to ventilate cellar rooms. There should be a large number of openings to facilitate the ventilation of the cellar as rapidly as possible. Cellars are useful only for relatively high-temperature storage, and the necessity for insulating the walls of them is not sufficiently appreciated. The insulation must be sufficient to protect the cellar against the comparatively high temperature of the earth; otherwise, the temperature



3705. Diagram showing common-storage house with false floor and false ceiling, and exhaust fan for forced ventilation.

of the storage room cannot be held materially below the earth temperature.

Common-storage rooms are frequently very cheaply constructed. The idea is prevalent that any old shed can be made to serve the purposes of a common-storage room for fruits or other products. The insulation is poor and, as a consequence, there is great fluctuation in the temperature. Proper insulation in the construction of a common-storage room is really more important than that for cold storage because there is no means of regulating the temperature except by ventilation or change of air, while the cold-storage room has artificial or mechanical means, the capacity of which can be increased to offset the heat leakage. To be effective, all common-storage plants must "conserve cold," and the necessity to provide efficiently against heat leakage through the walls, therefore, becomes doubly urgent.

The insulation for a common-storage room or building may be of the commercial kinds, which have been described, or use can be made of some of the cheaper common materials, such as straw, chaff, dry leaves, sawdust, and mill shavings. The principles of constructing the walls and using the insulation are all applicable to common-storage buildings and should be followed carefully if one expects to secure the best results. In addition to the insulation of the walls, an outer ventilat-

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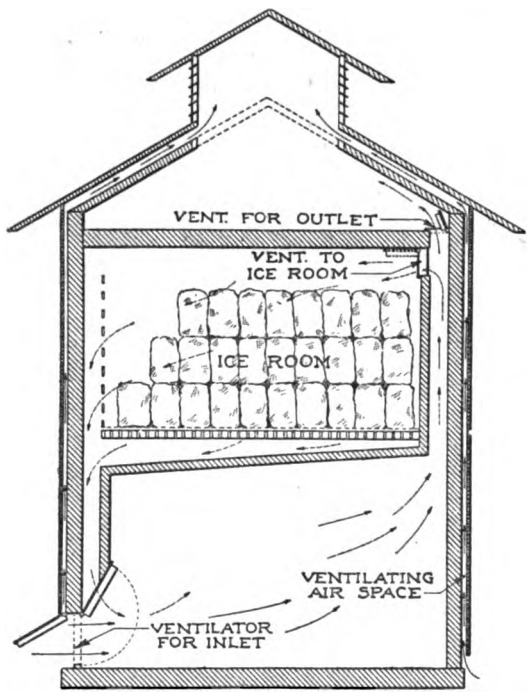
ing space is effective, especially during warm weather. Fig. 3704 is a diagram which shows the proper method of constructing a common-storage wall with an outer ventilating space designed to carry off most of the heat absorbed by the outer wall. Windows are not satisfactory for ventilating common-storage plants. The openings should be at or near the floor and there should be corresponding openings at the top, as shown in the diagram illustrated by Fig. 3704. The taking-in of the outer air depends upon the difference in temperature between the bottom and top parts of the building; therefore the greater the number of openings, the more rapidly the air of the room can be changed. A false floor is a distinct advantage, and will add very materially to the efficiency of the plant. The construction and use of such a false floor is illustrated in Fig. 3705. When the false floor is used, the openings or ventilators should open directly under the floor, so that the outer air may



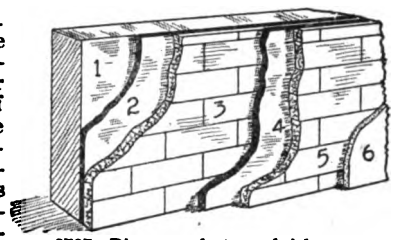
3706. Diagram showing construction and proper arrangement of ventilators in combined ice and common fruit storage room. Dotted arrows show directions of air when ice cooling is used.

have an opportunity to pass directly beneath the product stored in the room. A forced circulation is very much more satisfactory and will result in a more rapid change of air. In order to accomplish this, an exhaust fan should be placed at the top of the chamber, so that the air of the room can be drawn to the fan and exhausted into the outer air, thus creating a reduction of the air pressure within the rooms and the consequent drawing-in of the air to the room when the ventilators or traps of the room are open. Fig. 3705 shows a cross-section of such a chamber and the proper location of the fan.

In the combination of the ice cooling and common storage, ice and salt or even ice alone can be used to cool the fruit at the early part of the season. The tube method may also be used with ice and salt or the gravity-brine system before described can be advantageously utilized.

A diagrammatic cross-section of a combined ice-cooled and common-storage plant is shown in Fig. 3706. The design permits of the closing of ventilators and the opening of trap-doors, to utilize direct cooling from the ice stored above. A similar arrangement for the use of ice in small rooms can be made with the ice room or bunker placed at the end or side of the chamber.

The Figs. 3707 to 3713 are diagrams showing the proper construction of walls and the method of insulating walls, ceilings, and floors both with commercial insulation and common materials. Figs. 3707, 3708, and 3709 show the proper method of applying insulation to stone, brick, and concrete walls; while Figs. 3710, 3711, 3712, and 3713 show the method of applying insulation to ceilings and floors.

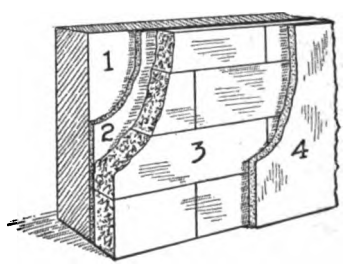


3707. Diagram of stone, brick, or concrete wall with two layers of commercial insulation. *1*, 8-inch wall; *2*, asphalt or cement; *3*, 2-inch commercial insulation; *4*, asphalt; *5*, 2-inch commercial insulation; *6*, cement finish or T and G boards.

In the operation of common-storage plants, the fruit must be carefully watched at all times. The temperature should be taken frequently. It is very desirable that the actual temperature of the fruit itself be recorded from time to time. For this purpose, glass thermometers, the bulbs of which can be imbedded in the fruit, are desirable. Long-stem thermometers can be obtained which have the bulb at the end of a long tube and the recording scale at the upper end, thus allowing the temperature to be taken at the interior of the package. It is possible to note temperature conditions of the fruit by observing the influences of the temperature within the package upon the temperature of the room. When the fruit is thoroughly cooled throughout the mass, there will be little change in temperature after the closing of the ventilators. If the insulation of the room is effective, the change in the temperature of the air of the room will be very slight. If, however, there is any considerable heat left in the body of the fruit, there will be a marked and rather abrupt rise in the temperature after closing the ventilators.

Careful attention to the condition of the fruit is necessary also to determine whether the humidity of the room is too high or too low. This will be shown by the appearance of the fruit. Excessive ventilation, i. e., the circulation of large volumes of air through the room, will cause shrinkage or shriveling, while insufficient circulation will favor mold. Special recording hygrographs which record the changes in humidity almost instantly upon a chart are very convenient adjuncts to storage rooms in order to observe the humidity conditions. Instruments which record both relative humidity and temperature on the same chart are obtainable. When one desires to operate properly, an investment in such an instrument is a distinct advantage.

The length of time which different fruits may be held varies for the kind of fruits and even for different varieties of the same kinds of fruits. The importance of storage, then, is relative; it is most important for fruits



3708. Diagram of stone, brick, or concrete wall with one layer commercial insulation. *1*, 8-inch wall; *2*, cement or asphalt; *3*, 4-inch commercial insulation; *4*, cement finish or T and G boards.

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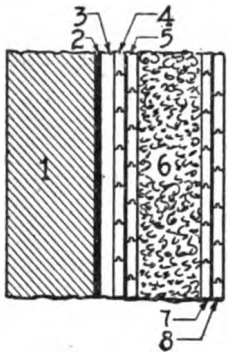
which may be held longest. A short period of storage may be relatively as important for the short-season fruits, such as the perishable berries. The ability to hold these fruits even for a few days may result in a great profit due to changes in market conditions. The holding of short-period fruits for a brief time is important for canneries because the fruit may be held in its best condition and this may result in a great saving to the canneries or factories when sufficient help cannot be obtained.

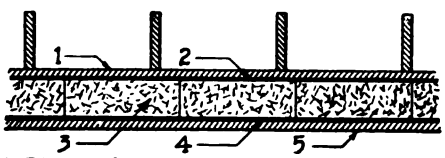


3709. Diagram of brick, stone or concrete wall, with insulation of mill shavings. *1*, 8-inch wall; *2*, asphalt; *3*, 1-inch air space; *4*, ⅛-inch T and G sheathing; *5*, ⅛-inch T and G sheathing; *6*, 6-inch dry mill shavings; *7*, ⅛-inch T and G sheathing; *8*, ⅛-inch T and G sheathing. Waterproof paper between adjoining sheathings.

Storage is most important for the apple. This fruit has the longest storage period of all. There are cases in which apples have been held in fair condition for as long as two years. It is, of course, not profitable or desirable to hold apples as long as this. The most important season is during the winter and spring months and until the fresh fruits come into the markets. As indicated above, the cold storage of the apple has resulted in making it an all-the-year-round fruit. Many varieties are held from one season until the summer apples of the next season are available. The so-called winter varieties are held to the best advantage.

There are three classes of apples: summer, fall, and winter. The summer varieties have the shortest storage season. The fall apples have a longer season but not so long as the winter varieties. It is upon the last class that dependence is placed for late-season supplies. The following fall varieties are the ones chiefly used for storage and, as a general rule, these may be held in first-class condition until the Christmas holidays or until the middle of January: McIntosh, Fameuse, Yellow Bellflower, Jonathan, Grimes. The following winter varieties are the ones of most importance for storage purposes: Baldwin, Ben Davis, Winesap, Yellow Newtown, Gano, Rome Beauty, Esopus, Northern Spy, Stayman Winesap, Banana, Ortley, Delicious, Lawver, Rhode Island Greening, Northwestern Greening, and York Imperial.

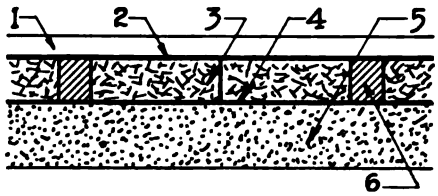
The varieties of pears which may ordinarily be used for storage are: Bosc, Easter, Anjou, Clairgeau, Comice, Howell, Winter Nelis, Duchess, Sheldon, and Kieffer.



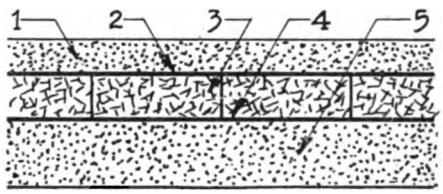
3710. Diagram of ceiling with commercial insulation. *1*, T and G sheathing; *2*, paper and asphalt; *3*, 4-inch commercial insulation; *4*, paper and asphalt; *5*, cement or T and G finish.

Factors underlying successful storage.

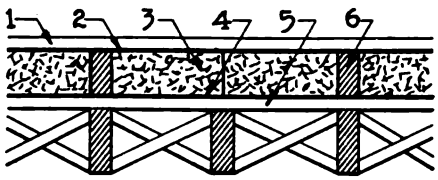
By means of investigations of the United States Department of Agriculture, the factors which govern the successful storage of fresh fruits have been carefully determined. The investigations have been extended through a number of years, since the work of Powell with apples in 1901–1902. There has been more work with apples than with other fruits but studies of the storage of grapes, peaches, pears, plums, cherries, and small-fruits have also been made. It is beyond the scope of this article to give in detail the results of researches with all of these fruits. In general, it has been found that there is a very definite relationship between the character of the fruit and the treatment given it in preparing it for storage, and its behavior in storage. The results from extensive experimental storage holdings have been consistent throughout; there have been no exceptions to the general principle of this definite relationship. It has been found, for example, that the influence of the place of production is frequently of great importance. The place and condition under which the fruit may be grown have a



3711. Diagram of floor insulation on concrete, wood finish. *1*, flooring; *2*, asphalt; *3*, 4-inch commercial insulation; *4*, asphalt; *5*, concrete; *6*, floor sleeper.



3712. Diagram of floor insulation on concrete, cement finish. *1*, concrete and cement floor; *2*, asphalt; *3*, 4-inch commercial insulation; *4*, asphalt; *5*, concrete.



3713. Diagram of floor insulation, frame construction. *1*, floor; *2*, asphalt and paper; *3*, 4-inch commercial insulation; *4*, asphalt and paper; *5*, floor sheathing; *6*, floor sleeper.

material influence on its behavior in storage. This is contrary to prevailing impressions but it is definitely certain. The character of the soil upon which the fruit is grown may have an important bearing on its storage quality. For example, apples from the lighter loam soils have better keeping quality than fruit grown on heavy or wet soils. In the study of the storage of grapes, it was found that the fruit grown in certain types of soils have better market and storage qualities. Some Tokay grapes, grown in California in light sandy soil, reach the limit of their market condition in November, while grapes of the same variety grown in heavy black soil may be kept in good condition until after Christmas. The Emperor grape, which has become an important storage fruit in California, is produced under best conditions in the red soils of the higher benches of the foothills of the Sierras. The same variety grown under valley conditions where the soil is of a different character, does not color so well and does not have as good storage qualities. The same is true of the Almeria grape, which is likely to become a very important storage fruit in California. At present the supplies of this grape come almost exclusively from Spain. The grapes are packed in granulated cork and the Spanish product is frequently held for several months in common stor-

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age. California-grown Emperor and Almeria grapes are packed in redwood sawdust and are successfully held in cold storage, the former until the middle of January, and the latter several months later.

Differences of one to three months in the storage qualities of the same varieties of apples have been found to be due to the place of production. Mention has already been made of the storage weakness of the Yellow Newtown and other varieties grown in the Central Pacific coast district of California. The same varieties grown in the Pacific Northwest and in Virginia and other sections of the country are free from this particular weakness.

The care of the orchard and method of culture given the trees have been found to be important factors. The character of tillage, pruning, age of trees or vines are also considerations, especially when taken in connection with different climatic conditions. The fruit from young trees or vines has weak storage qualities: it is usually large, coarse, sappy, and cannot be held in storage nearly so long as fruit of the same variety from older and more mature trees. Dense-headed trees produce fruit of poor color; the green, poorly colored apples produced under such conditions do not have high storage quality. Such fruit is very susceptible to the trouble known as storage-scald; the loss from this source may be avoided and the storage quality of the fruit may be much improved by better orchard methods. Pruning to open up the crowns of the trees will improve light conditions, especially where intense sunlight does not naturally prevail. Some growers actually cut away the leaves of the vines to allow light to color and mature the grapes to better advantage. In sections such as the arid regions of the Pacific coast, where intense light conditions prevail, the opening-up of the tree crowns must be done with greater care. It is not necessary to open up the trees to such an extent as is necessary where intense light is not naturally available.

Late growth also affects the storage qualities, as it prevents the proper maturing of the fruit. In irrigated districts, the late application of water may stimulate the growth while the fruit is maturing and this may result in sappy poorly colored fruit of low storage quality. The question is often asked whether the fruit produced in irrigated districts has as good storage qualities as that from non-irrigated districts. The impression seems to prevail that it does not. This is erroneous, as has been shown by extensive investigations. It is manifestly impossible to compare directly fruit grown under irrigation in one district with fruit grown without it in another. The varieties are different and other factors may operate to change conditions in the one case or the other. There are thousands of boxes of irrigated fruits held in the best possible condition in storage, and this would seem to be a direct answer to the question of the keeping qualities of fruits grown under irrigation. It is necessary, of course, to have the irrigation properly applied; if overdone by applying large quantities of water late in the year in order to induce large sappy growth, the results are fruits of poor storage qualities.

In sections which have dry summers, where tillage is depended on to conserve the moisture, the work must be thoroughly and properly done; otherwise, the moisture supply in the soil will be deficient, and the trees or vines will be under stress on account of the lack of sufficient moisture. Fruit produced under such conditions has very low storage quality. Any condition of soil, climate, and orchard treatment which results in the production of abnormal fruits may be important governing factors in their behavior in storage. Spraying for the control of insects and diseases is important from the storage standpoint. It is necessary that this work be thoroughly and properly done, as insect and disease injuries render the fruit liable to deterioration. The insect or disease may be of itself the cause of the decay or deterioration. There is also an indirect effect: when the trees are weakened by the effect of insects and diseases, the results may be weak fruit of poor storage quality.

Seasons affect the quality as well as the quantity of the crop. In seasons of unusual drought, for example, the fruit may be so weakened that its storage qualities may be seriously impaired. On the other hand, unusually wet seasons result in the production of sappy fruits which deteriorate rapidly. In seasons of unusual drought, the orchards under irrigation have a distinct advantage, provided the application of the water is properly adjusted. The effect of frost may be beneficial or otherwise: A crop may be thinned to such an extent that its condition may be somewhat improved since over-production by the tree may result in weak fruit, while the thinning will improve this condition. On the other hand, where the frost is sufficient to destroy most of the crop, the remaining fruits may be sappy and overgrown and otherwise weak. The frost-injured fruits themselves have not as high storage qualities. During an unfavorable season, fruit which has been placed in storage must be carefully watched throughout the entire storage period. Its condition should determine the length of time it is held. The effect of storage is such that attempts to hold the fruit beyond its normal life period result in serious losses. Fruit of low vitality, when the limit of its life is reached, will deteriorate very rapidly after withdrawal from cold storage. It is important, therefore, not to wait until the fruit is ready to break down before withdrawal.

Fully matured well-colored fruit keeps best and longest. Early notions that fruit for storage should be picked in an immature condition are erroneous. The fruits which are picked before full maturity have low storage qualities. There is serious deterioration from shriveling and, in case of apples, there is a definite relationship between the occurrence of scald and the state of maturity at which the fruit is picked. This disease is a peculiar browning or scalding of the skin of the fruit. It does not extend into the flesh except under very severe conditions. Immature fruit is seriously affected while fully mature fruit of the same variety may be held without deterioration from this cause.

Full maturity means that the "ground color" is plainly developed, the flesh of the fruit firm, and the seeds fully grown and colored. This principle is correct for all fruits with the possible exception of most varieties of pears and lemons. Over-ripeness must be avoided. A designation of the proper stage of maturity for picking fruits is difficult; it must be learned by actual experience. Over-ripeness or over-maturity occurs when the fruit begins to soften. In some instances, growers are in the habit of allowing the crop to remain on the trees until all the fruits are fully colored. This is a wrong practice, as some fruits mature before others, and if allowed to remain until all are colored, may become over-ripe or over-mature. It is best to make more than one picking, especially with the earlier ripening varieties. Fruits on the outer branches exposed to full light ripen first and the best results in storage are obtained when these are held separately, unless the trees are well and properly pruned.

Reference has been made to the importance of cooling the fruits promptly and rapidly, in connection with the ripening processes and life activities and the effects of temperature on these factors. Delay in storage, which means delay in cooling, during warm weather may shorten the storage period from one-third to one-half. Experiments with apples held at a comparatively high temperature for a period of ten days or two weeks before cooling, showed that fruit thus treated could be held only from one-third to one-half as long as the same varieties promptly stored and cooled after pick-

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ing. There is also a direct influence on the occurrence of scald. Prompt cooling, as a rule, prevents the occurrence of this disease. This factor is of special importance for early-season fruits or early varieties of apples like Jonathan. The practice which prevails in many sections of allowing the fruit to accumulate for some time before placing it in storage is likely to result disastrously if the season happens to be warm. This is especially true where the fruit must be packed while warm. The ideal condition is the placing of the fruit under refrigeration immediately after picking from the tree and the nearer this can be approached in practice, the longer the fruit can be held in storage.

The proper storage temperature for different kinds and varieties of fruits has already been referred to. The influence of a low temperature, especially for apples, is most important. Experiments show the occurrence of scald to be less severe at 32° than at a higher temperature. The use of a low temperature is also important because of the rapidity with which the fruit within the package can be cooled. In operating either a common- or cold-storage plant, the temperature of the fruit is an important factor to consider. When a fruit is first placed in the storage room, a considerable length of time may be required to reduce its temperature to the desired point, if means are not at hand to increase the cooling effects. In cold-storage rooms the cooling can be hastened by holding the air of the rooms at a temperature several degrees lower than the desired temperature. A temperature of 25° to 27° F. may be safely maintained until the fruits in the packages approach the storage temperature. In this way the operator can materially hasten the cooling effect, and this hastening is desirable. It is commonly assumed that the cooling should be gradual, but as yet there is no experimental evidence to indicate that rapid cooling is at all injurious.

The investigations of the United States Department of Agriculture show conclusively that the character of the treatment given the fruit in preparing it for market or storage has a material influence upon its keeping quality. Fruits which are roughly handled and bruised or injured to any extent have their storage qualities seriously affected, and decay and deterioration follow the injuries. There are some forms of decay or deterioration which cannot develop unless there are injuries of some kind on the fruit. A break in the skin will allow blue mold to gain entrance, while a sound skin may prevent the development of this form of decay. Blue mold is one of the most common forms of loss both in common and cold storage and occurrence of this trouble is due almost exclusively to rough handling. The blue mold does not grow upon the sound skin of a healthy fruit. The importance, then, of handling the fruits with extreme care throughout all the processes of picking, grading, and packing cannot be too strongly emphasized. Bruises or breaks in the skin may mean a decayed fruit. This general principle has been established through a long series of careful investigations and thus far there has been no exception.

There are other decays which affect apples and other fruits: the principal diseases affecting apples are brown- or ripe-rot, anthracnose, and bitter-rot. These diseases are not dependent upon the care in handling the fruit so far as the occurrence of bruises or injuries is concerned. The spores are present on the fruit when it is packed and the control of the disease in storage goes back to the orchard treatment and the control of the fungi on the trees. All three of these decays occur on the trees as canker spots and the spores which inhabit the fruits develop from these cankers. Control of the cankers by cutting out or spraying will materially reduce the occurrence of decay in storage.

There are other forms of deterioration which, so far, have not been traced to any definite organism. These are obscure physiological diseases and result in the breaking down of the flesh of the fruit, or in burning of the tissues, or in a scalded appearance of the skin. These physiological troubles have been found to be due, at least to some extent, to rough handling or to pressing. A physiological breakdown also occurs in fruit which is over-ripe when it is stored. It also occurs seriously in fruit which has been delayed in cooling after picking. Physiological breakdown also occurs in fruit which is held beyond its normal life limit.

Ordinary storage-scald has already been referred to. The nature of this disease is unknown but it is supposed to be due to the action of enzymes upon the skin of the fruit. There is another form of scald which, for want of a better term, has been designated as "soft scald." Ordinary storage-scald does not soften the skin except in the most advanced stages. The soft scald produces a softening of the skin and also of the flesh directly beneath the skin. It occurs also in more or less distinct areas or zones, sometimes extending completely around the fruit. The nature of this disease is obscure and, so far, storage treatment, orchard treatment, and temperature effects do not seem to have any bearing on it. It has been attributed to the freezing of the fruit in storage and, while definite results from the effects of freezing have not been obtained, it is possible that in storage rooms of uneven temperature conditions portions of the rooms may have temperature conditions sufficiently low actually to injure the fruit.

For discussion of precooling, see the article *Transportation*.

A. V. Stubenrauch.

STOVE PLANTS. The term "stove" applied to plants undoubtedly originated from the method of heating the structures in which plants were grown before the advent of hot water and steam. Glasshouses such as then existed were heated by stoves and flues, usually made of bricks. Such structures came to be called stovehouses or stoves, and the plants grown in them "stove-plants." (A "greenhouse" was in those days an unheated glasshouse in which plants were merely kept alive over winter.) These terms still exist in England, but are applied to strictly tropical plants or those requiring a warm temperature for their successful culture in glasshouses. In this country such plants are usually spoken of as warmhouse or tropical plants.

In England, at the present time, more distinction is made in the names applied to plant-houses than in this country. For example, "greenhouse" in England means the coolest glasshouse only, while in this country the name is usually indiscriminately applied to all glasshouses. The names applied to plant-houses in England are therefore: stove, for tropical plants; intermediate house, for plants hailing from warm-temperate climates; greenhouse, for those plants requiring the least degree of heat. A conservatory or show-house is one in which plants are placed while in flower and usually kept at a cool temperature.

In practice such terms may be greatly modified to suit local conditions; for example, glasshouses are sometimes named cool-temperate house, warm-temperate house, tropical house, palm-house, acacia- and succulent-house, experiment-house and propagating-house, the temperatures and moisture conditions being regulated to suit the requirements of each class of plants.

The cultivation of stove plants is too heterogeneous a subject to be treated exhaustively in a single book, because the stove contains thousands of dissimilar plant treasures from the tropics, especially those found at low altitudes. In general, the stove is the house which requires the most expense and care, the greatest heat and the highest atmospheric moisture. For the general principles of its management, consult *Greenhouse Management*, p. 1408.

Edward J. Canning.

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STRANVÆSIA (for Wm. Fox-Strangways, English botanist). *Rosàceæ*, tribe *Pòmeæ*. Ornamental woody plants grown for the handsome foliage and the attractive flowers and fruits.

Evergreen trees or shrubs: lvs. entire or serrate, with subulate stipules: fls. white, in terminal many-fld. corymbs; calyx turbinate, 5-toothed; petals 5, generally obovate, clawed, stamens about 20; styles 5, connate to the middle or higher; ovary 5-celled, the cells 2-ovuled: fr. a small pome, crowned by the persistent incurved calyx-teeth, the cells usually 1-seeded.—Two or 3 species in China and Himalayas. These are handsome evergreen small trees or shrubs with generally oblong rather large or medium-sized lustrous lvs. and small white fls. with quickly deciduous petals in often ample corymbs, followed by attractive red subglobose pea-sized frs. They are suited for warmer temperate regions, but *S. Davidiana* var. *undulata* seems to be hardier and with protection survives the winter as far north as Mass. Prop. is by seeds or by cuttings of half-ripened wood under glass.

Davidiàna, Decne. (*S. Hénryi*, Diels). Shrub, 4–20 ft.: young branchlets silky-villous: lvs. on slender hairy petioles ½–¾in. long, oblong to oblong-lanceolate or oblanceolate, acuminate, cuneate at the base, entire, green and glabrous on both sides except pubescent on the midrib above and often beneath, 2½–4½ in. long: fls. white, ⅓in. across, in loose, more or less villous corymbs 3–4 in. across; stamens about as long as petals, with red anthers: fr. subglobose, scarlet, ¼–⅓in. across. June. W. and Cent. China. Var. **undulàta,** Rehd. & Wilson (*S. undulàta*, Decne.). Lvs. elliptic-oblong to oblong-lanceolate, usually wavy on the margin, 1½–2½ in. long: corymbs 1½–3 in. across, sometimes nearly glabrous. B.M. 8418.

Nússia, Decne. (*S. glaucéscens*, Lindl. *S. glaùca*, Baill.). Small tree: young branchlets like the infl. villous at first, soon glabrous: lvs. obovate to oblanceolate, short-acuminate, serrulate, 2–5 in. long: fls. white, ½in. across, in corymbs 2–5 in. broad; stamens about half as long as petals, with yellow anthers: fr. subglobose, orange, ⅓in. thick. June. Himalayas. B.R. 1956.

ALFRED REHDER.

STRATIÒTES (Greek, *soldier*, referring to the sword-shaped leaves). *Hydrocharitàceæ*. WATER SOLDIER, or WATER ALOE. Perennial hardy aquatic herb of small ornamental value but considerable botanical interest: st. very short, stoloniferous: lvs. clustered, all sessile, submerged, linear-lanceolate, fleshy, acute, margin with many pointed teeth: scapes short or elongated: spathes extending above the water, unisexual, 2-lvd.: fls. white; male fls. 2 to several in a spathe, pedicelled, perianth 2-rowed, 3-merous; stamens 11–15; pistils rudimentary or none; female fls. solitary in the spathe, short-pedicelled, perianth similar to male; staminodes many, linear; ovary oblong, somewhat 6-celled: fr. on a recurved pedicel, laterally exserted from the spathe, ovoid, acuminate.—One species, Eu. The plant has a distinct calyx which is not the rule among monocotyledons.

One of the peculiarities of stratiotes is that in summer the whole plant rises to a point near the surface when it is only partly submerged, and later in the season it drops below the surface. Young plants do not act thus. It is propagated by side shoots from the base of the leaves. Toward fall and early winter these shoots are merely bulblets and are readily detached from the plant and are in a good condition for traveling. It is not desirable for the aquarium on account of its spiny leaves. (Wm. Tricker.)

aloìdes, Linn., is the only species in the genus. It is sometimes called CRAB'S CLAW or FRESHWATER SOLDIER. In England the planting of this species is discouraged from the fact that it spreads too rapidly. Peduncles rising from among the lvs. to a few inches above the water, much thickened at the top, bearing a spathe of 2 bracts: ovary and stigmas nearly as in Hydrocharis, but the fr. is ovoid and somewhat succulent. G. 2:466.

F. TRACY HUBBARD.†

STRAWBERRY. The species of Fragaria, grown for the fruit. (For the morphology of the strawberry fruit, see Vol. I, page 40.)

The strawberry is an herbaceous perennial. It naturally propagates itself by means of runners that form chiefly after the blooming season. Seedage is practised only with the Alpines, and in raising new varieties. Division of the crown is useful for propagating varieties that are practically runnerless, as the Bush Alpine and Pan-American. The runner plants, either transplanted or allowed to remain where they form, will bear the following year. Usually the plants will continue to bear for five or six years, but the first and second crops are generally the best. Good results are sometimes secured from plants over ten years old, especially when they are grown under hill training and intensive culture, but this is a special practice. It is therefore the custom to plow up strawberry beds after they have borne from one to three crops. The better the land and the more intensive the cultivation, the shorter the rotation. In market-gardening areas and in some of the very best strawberry regions, the plants are allowed to fruit but once. The plants therefore occupy the land only one year and the crop works into schemes of short-rotation cropping. When the bed is fruited more than one year it should be renewed immediately after the crop is harvested. In the case of matted or spaced rows, this consists of reducing the number of old plants, using the plow, disc-harrow, cultivator, or hoe, and in stirring the soil to provide favorable conditions for the rooting of new runners. It is customary, also, to mow the leaves and burn them. In the case of hill or hedge-row plants, renewal consists of mowing and in drawing about an inch of fresh soil around the plants, so that new roots will form above the old ones. Throughout the North, and as far south as Kentucky and Missouri, beds are fruited but one year, occasionally two, rarely longer. In Florida and the coastal plain of the Gulf states, the plants occupy the ground but six to eight months. In the lower Mississippi Valley and on the Pacific coast, beds are fruited three to six years. The strawberry delights in a rich rather moist soil and a cool season. It can be grown in the cool part of the year in the South and thereby becomes one of the most cosmopolitan of fruits. The young plants may be separated from the parent and put into new plantations in August; but under average conditions in the North it is usually better to wait until early the following spring, since the weather is likely to be too hot and dry in the late summer or fall. South of Virginia, Tennessee, and Arkansas, and on the Pacific coast, most of the planting is done in the fall or winter months. Plants that have not borne are best for setting. They are plants of the season: that is, plants

3714. Strawberry plant ready for setting.

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CVIII. Strawberry.—The Climax variety.

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which start in the spring of 1916 are fit for planting in the late summer or fall of 1916 or in the spring of 1917. These plants have many long, fresh, light-colored roots. Fig. 3714 shows such a plant, with the roots trimmed for planting. Fig. 3715 shows a plant that has borne. This plant bore fruit, say, in 1915, and has thrown up a new crown in 1916. The old dead crown is seen at the right. The young growth is lateral to this old crown. The roots are relatively few and are hard and black. These plants sometimes make good plantations under extra good care, but generally they should be avoided.

Two- or 3-inch pots are sometimes plunged under the new runners in June and July, and they become filled with roots in two or three weeks. These pot-grown plants are excellent for fall setting in the home-garden, but they are seldom employed in extensive commercial practice on account of their expense. Almost as good results can be secured by setting strong layer plants. (Fig. 3716.)

3715. Old strawberry plant, usually not desirable for setting.

In Florida and in the coastal plain of Georgia, Alabama, Louisiana, Mississippi, and Texas, beds need to be reset annually, in September or October; plants set at this time produce a good crop in the following February, March, and April. The plants may be produced at home, but more commonly are secured from the North.

In hill training, each plant is allowed a space by itself, cultivation is given both ways, and no runners are allowed to set. Hill or stool training is practised commercially in Florida, the Gulf States, and on the Pacific coast, and, to a slight extent, in northern market-gardens. It is the most practicable method under irrigation, and in a very humid climate. The chief disadvantage is the heavy expense of removing all the runners. Hills give choicer berries than narrow matted rows, but the yield is not so heavy. For commercial results, plants are generally trained in narrow rows. The old method was to plant in rows 3 to 3½ feet apart and the plants from 12 to 15 inches apart in rows, keeping off the runners until late in July and then allowing the runners to grow and root at will, making a wide matted row. In this system some plants are almost on top of others, the roots barely in the ground, and they suffer in a season of drought. The rows are so wide that to pick fruit in the center it is almost necessary to crush fruits on the outside of the row. This system gives few large first-class fruits, and is now passing away. The largest and highest colored fruits are found on plants along the outside of the rows; therefore have as many outside rows as possible. This may be accomplished by having rows closer together and much narrower. The rows are made from 30 to 36 inches apart and the plants from 18 to 24 or even 30 inches apart in the rows, much depending on the prolificacy of the variety as a plant-maker. If the plants used for a new bed are strong and start into growth vigorously, the first runners are used, as it has been found that under most conditions the plants about twelve months old yield the greatest number of fine fruits. These first runners are usually "bedded-in," i. e., planted by hand, training them along the wide way of the rows, using from four to eight of the first runners and cutting off those growing later. This method of planting allows cultivation both ways until the runners start, retaining moisture and saving labor in hoeing.

In the "narrow matted row," which is now used more than any other method of training, the runners are allowed to set at random until they have made a row 12 to 24 inches wide; subsequent runners that encroach upon the tilled middles are cut off. In the "spaced row," the early runners are set by hand at more or less regular distances apart until a row 12 to 24 inches wide has been formed; thereafter all other runners are cut off. In the "hedge row," two to four runners are set from each mother plant, and are kept in alignment, forming a single, double, or triple hedge row; all other runners are removed. The drift is steadily away from the matted row toward the spaced row and hedge row. Surplus runners are pulled off or are cut off with a knife, hoe, or one of the many types of runner-cutters that may be attached to the cultivator. Circular cutters are used for hill plants. In late fall, the matted row may be thinned by pulling out the weaker plants with an iron rake or spike-toothed harrow.

3716. Pot-grown strawberry plant.

In the North, strawberries are usually mulched in the fall, in order to protect them from alternate freezing and thawing in the winter and early spring and to prevent the soil from heaving. In some cases the mulch is allowed to remain on the plants rather late in the spring, in order to retard the season of bloom. Sometimes the crop may be retarded a week or ten days by this means. It should not be removed until settled spring weather has come, nor left on so long that the plants bleach. The mulch is more necessary in regions of light and precarious snowfall than in those in which

3717. Heavy mulching of strawberry plants, as practised in parts of the North.

the snow blanket is deep and lies all winter. In regions of deep and continuous snowfall, a heavy mulch is likely to prove injurious. Experience has shown that the best mulch is some strawy material. Along the seacoast, salt hay from the tide marshes is much used. In interior places clean straw, in which there is no grain to sprout and to make weeds, is very largely employed. (Fig. 3717.) In the South, pine needles are used. Some-

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times loose strawy manure is used, and the mulch adds fertilizer to the soil as well as affords protection. Corn fodder, leaves, brakes, seaweed, evergreen boughs, and other wild herbage are used occasionally. Cowpeas and sorghum are grown for mulching material when straw is scarce. The practice of growing oats, barley, or some other small grain between the rows of strawberries, to fall down and mulch the berries, is not generally advisable. Under ordinary conditions the mulch is 3 or 4 inches deep over the plants after it is fairly well packed down. It is not always possible, however, to mulch as heavily as this, since the material is likely to be expensive when one has a large area. The mulch is usually applied late in the fall after the ground has frozen, and, if the material is abundant, both the plants and the intervening spaces are covered. In the spring the mulch is raked from the plants as soon as they begin to start. Some persons allow it to lie between the rows as a cover to retain moisture and to keep the berries clean. The most expert growers, however, prefer to take the mulch from the field and to till the plantation once or twice before the plants are in bloom; the material is then returned and spread on the loose soil between the rows and beneath the vines. In the northern prairie states, heavy mulching is essential. For western Minnesota and Dakota a covering of at least 6 inches of straw is advised. This mulch is easily provided, since straw is so abundant in that country that it is often burned as the readiest means of getting rid of it. When not mulched in that region, the plants are likely to be killed outright or to start with a very weak growth. Mulching for winter protection is not necessary south of Virginia and Missouri, but mulching to keep the fruit clean is as profitable in the South as in the North. The fruiting mulch is applied after the plants begin to bloom. Pine "straw" is used most. A large handful is dropped upon each plant; the leaves soon push through. Rarely is it desirable to cover the entire area between the rows. On the Pacific coast, strawberries are not mulched, as it is not necessary for winter protection, and it would interfere with irrigation.

3718. Sexes of strawberry flowers: at the left a perfect flower; at the right a pistillate flower; in the middle, stamens few.

Strawberry flowers may be either perfect or imperfect, and the nature of the flower is characteristic of the variety. In some kinds, the flower is perfect or hermaphrodite (having both stamens and pistils) and is consequently self-fertile. These are commonly called staminate varieties. In others it is pistillate, producing little or no pollen, and requiring a pollen-bearing variety to pollinate it. (Fig. 3718.) There are no modern varieties bearing only staminate or sterile flowers, although such forms were common about 1840. The perfect-flowered varieties differ greatly in the amount of pollen they produce. Some, as the Crescent and Glen Mary, bear so few stamens that they are practically pistillate or sterile. Any variety will fertilize any other variety if it bears sufficient pollen and if the two kinds bloom at the same time. The variety used as a pollinizer does not affect the shape, color, and quality of the fruit of the pistillate sort, as was once thought. It is preferable to plant an early-blooming pollinizer on one side of the rows of the pistillate sort, and a late-blooming pollinizer on the other side. When planting pistillate varieties, every third row should be a pollen-bearing kind. Pistillate varieties as a class are somewhat more productive and hardy than staminate varieties as a class; but this fact has little weight, since some staminate sorts are fully as prolific and hardy as the best pistillate varieties. It is an inconvenience to be obliged to mix varieties for pollination; hence pistillate varieties are steadily declining in popularity. In time, all North American varieties will be staminate, as is now the case in England. The horticultural bearing of the sexual characters of the strawberry flower was first clearly explained in this country by Nicholas Longworth, of Cincinnati (see page 1585; also his essay on the subject in his "Cultivation of the Grape," 1846, and the "Strawberry Report" of the Cincinnati Horticultural Society, 1848). When many of the achenes or "seeds" of the strawberry are not fertilized or are killed by frost or other means, the berry fails to develop at that point and a "nubbin," or imperfect berry, is the result (Fig. 3719). Nubbins are usually most abundant late in the fruiting-season, when the pollen-supply is small and when the plants are relatively exhausted.

3719. Strawberry nubbin.

Ordinarily the common varieties bear but once a year, in the spring. Under certain conditions of temperature and moisture they may become "double croppers," and give a fall crop, also. In the South, particularly in southern California, the bearing season may be extended over several months; but no varieties were consistently everbearing in the North until 1898, when Samuel Cooper, of Delevan, New York, found the Pan-American in a row of Bismarck. European everbearers, which are hybrids of the common strawberry and the Alpine, do not succeed here. The numerous descendants of the Pan-American are true everbearers; they yield a small quantity of berries throughout the season from spring-set plants. It is better, however, to cut off all blossoms until midsummer; then there will be considerable fruit from August until frost, but not so much as a good crop from a spring-bearing variety. The culture of the everbearers does not differ materially from that of other sorts, save in the cutting of the blossoms weekly, which is a heavy expense. They require rich soil and an equable supply of moisture; they fail in a dry season. The market for berries in late summer and fall is limited, and the cost of picking is heavy. The following spring, a year from the time they were set, the everbearers produce a good crop, perhaps equaling that of single-bearing sorts. This is one point in which the North American everbearers are distinctly superior to those of Europe. The everbearers have little commercial future merely for supplying summer and fall berries, but their habit of bearing a heavy spring crop, also, may make them useful to some growers who cater to personal or near markets. They are not likely to find favor with those who grow strawberries for the wholesale market. The everbearers are valuable mainly for the home-garden.

The cost of growing an acre of strawberries under commercial conditions in Oswego County, New York, is approximately as follows:

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Rent of land, two years	$11 00
Plowing and fitting	6 00
Plants	15 00
Setting plants	4 00
Cultivation	16 00
Straw for winter and fruiting mulch	15 00
Labor—hoeing, pulling weeds, etc.	10 00
Total cost	$77 00

Many northern growers raise berries at a much less cost, and a few exceed this sum, especially when located near a large town where rents are high; but it would be safe for one about to engage in strawberry-growing to figure close to this total, aside from the cost of fertilizer.

A Michigan grower estimates that the cost of producing and marketing an average yield of 200 sixteen-quart crates to the acre is $1.56 a crate; and the average net return 88 cents a bushel, giving a profit of $88 an acre. This is fairly representative of field culture in the North. The high cost of production in Florida is in marked contrast. As reported by a Plant City grower it is:

Interest on investment and land	$20 00
Interest on equipment	10 00
Preparation of land	10 00
Fertilizer	40 00
Plants	40 00
Setting plants	5 00
Cultivation	10 00
Picking 3,000 quarts at 2½ cents	75 00
Grading and packing at 1 cent	30 00
100 crates at 15 cents	15 00
3,000 boxes	11 00
Hauling to station	10 00
	$276 00

Still another phase of strawberry economics may be observed in southern California. There it costs 3½ cents to produce and market a pint box of strawberries, and the average selling-price is about 5 cents. Although yields of 10,000 to 15,000 quarts to the acre are common, the expense of picking is very heavy, since the season lasts six to eight months, and it costs $150 an acre to set a new field, since it requires 30,000 plants to the acre. These examples serve to illustrate the very wide range of conditions. The average yield, according to recent census statistics of the United States and Canada, is 1,700 quarts to the acre. The average selling-price, net to the grower, is 6 to 7 cents a quart. Authentic yields of 25,000 to 27,000 quarts to the acre have been secured under intensive culture.

3720. Wilson strawberry. (×½)

New varieties of strawberries are raised from seed with the greatest ease. The generations of strawberries are short and new varieties soon find favor. The varieties change so frequently in popular estimation that it is impracticable to recommend a list of them in a work like this. The first great American berry was the Hovey, introduced in 1838. (Fig. 1861, Vol. III.) The most popular single variety has been the Wilson (Fig. 3720), introduced in 1854 and still popular in Canada and the northern Pacific states. It held almost undisputed control of the market from 1860 to 1880, when the Crescent and Sharpless secured recognition. These three are the most important North American varieties; two-thirds of the 348 varieties of known parentage have descended from them. Other old favorites, now no longer grown, are the Cumberland, Triumph, Downer Prolific, and Charles Downing. European varieties do not succeed here; notable exceptions are Jucunda, and Triomphe. Over 1,800 varieties of North American origin have been introduced but less than 150 of these have attained prominence. The oldest North American variety now cultivated is the Longworth, introduced in 1851; it is still prized in the San Francisco market. The dominant commercial varieties of today are the Dunlap, Haverland, Marshall, Klondyke, Aroma, Gandy, Glen Mary, Bubach, Brandywine, Clark, Warfield. At least fifty others are grown to a considerable extent. The accompanying pictures (Figs. 3720–3725) show types of American strawberries.

3721. Gandy strawberry. (×½)

The strawberry has been in cultivation but a short time, as compared with other fruits. It has been grown in gardens less than 600 years, and was not cultivated commercially to any extent until early in the nineteenth century. The first record of garden culture is in France, early in the fourteenth century. This was the wood strawberry, *Fragaria vesca*. The common wild strawberry of eastern North America, *F. virginiana*, was introduced into Europe early in the seventeenth century. Neither species showed much promise under cultivation. *F. chiloensis*, which is native to the Pacific coast of America, was brought to Europe from Chile in 1712, by M. Frezier, a Frenchman. See *Fragaria*. Although the berries are large, this species found little favor because of shy bearing and poor quality; it gave practically no improved varieties. Near the middle of the eighteenth century the Pine strawberry (referring to the pineapple fragrance of the fruit) appeared in Europe, and became the principal progenitor of the garden strawberry. The botanical origin of the Pine is obscure. One view is that it was a form of *F. chiloensis;* another, that it resulted from the hybridization of that species with *F. virginiana* in European gardens; all the early importations of the Chile were pistillate plants, and varieties of the Scarlet were commonly planted with them. The first of the modern race of large-fruited varieties was the Keens' Seedling, originated by Michael Keens, of England, in 1819; it was a Pine, and from it have sprung most of the European varieties of today. The Hovey, from which modern North American varieties have descended in large measure, was undoubtedly a Pine in part, but there is considerable evidence that one of its parents was a variety of *F. virginiana.*

Wild strawberries were so abundant in North America that there was no garden culture of this fruit until about 1770. The Alpine and Hautbois types of strawberries (*F. vesca* and *F. moschata*) were introduced then from Europe, but did not become popular; preference was given to transplanted wildings of the Scarlet. These species have never been grown here except by a few amateurs. Commercial strawberry-culture began soon after 1800, mainly in the vicinity of the four largest towns of that period—Boston, New York, Philadelphia, and Baltimore. The varieties used were slightly improved forms of *F. virginiana*, notably Large Early

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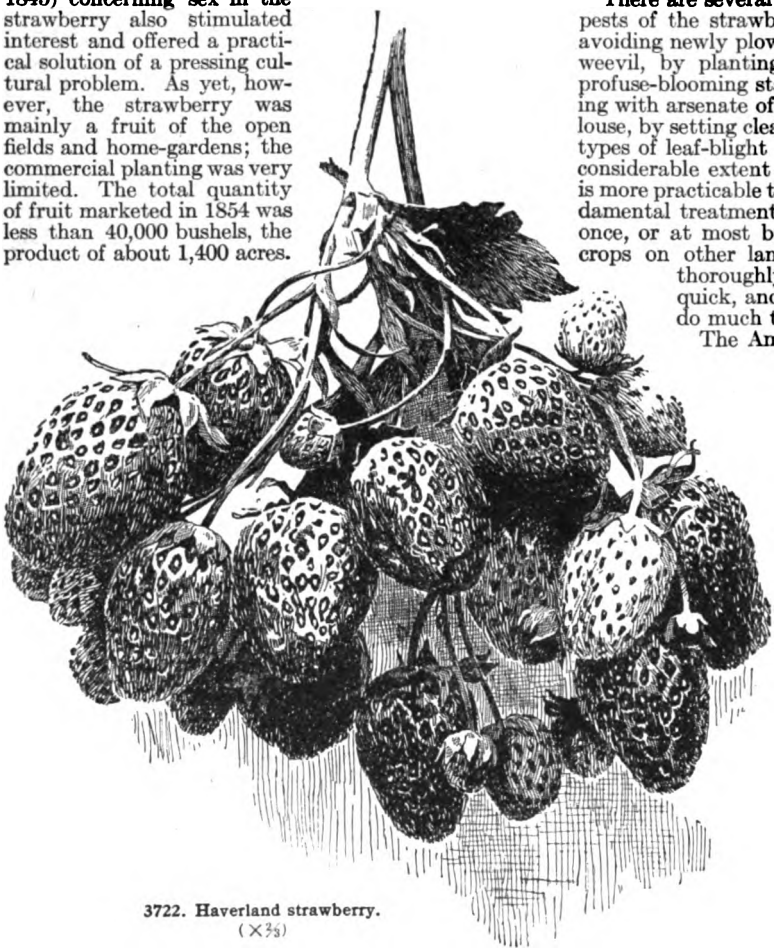
Scarlet, Hudson's Bay, Early Hudson, and Crimson Cone. These persisted until the introduction of the Wilson. The first variety of any fruit produced in North America by hand-crossing was the Hovey, originated by C. M. Hovey, of Boston, in 1836. The Hovey was a failure as a market variety, except in a few places, but it was an excellent amateur variety and greatly increased interest in strawberry-culture. The heated discussion of "Longworth's Theory" (1841–1845) concerning sex in the strawberry also stimulated interest and offered a practical solution of a pressing cultural problem. As yet, however, the strawberry was mainly a fruit of the open fields and home-gardens; the commercial planting was very limited. The total quantity of fruit marketed in 1854 was less than 40,000 bushels, the product of about 1,400 acres.



3722. Haverland strawberry. (×⅔)

The variety that marked the beginning of commercial strawberry-culture in North America was the Wilson, originated by James Wilson, of Albany, New York, in 1851. Until then, strawberry-culture had been difficult, and the results very uncertain; the Wilson thrived under even indifferent care. Its introduction was followed by a remarkable increase, coincident with the extension of railroads, in commercial planting. The "strawberry fever" that swept over the country between 1858 and 1870 has not been equaled in intensity by the boom days of any other fruit. The inevitable reaction came between 1870 and 1885. This was emphasized by the heavy losses from shipping berries long distances without refrigeration. The experiments of Parker Earle, of Cobden, Illinois, resulted in the first successful use of the modern refrigerator-car system, in 1887, and made possible the great shipping districts of today, many of which are over 1,000 miles from their markets. There are now approximately 150,000 acres of strawberries in the United States, and 14,000 acres in Canada. The value of the crop is $20,000,000 annually. The strawberry is fourth in commercial importance among deciduous fruits, being preceded by the apple, peach, and grape. The most important shipping districts, according to the Census of 1909, are Maryland, 14,292 acres; Tennessee, 10,761; Missouri, 9,048; New Jersey, 8,684; Michigan, 8,051; Arkansas, 7,361; Ontario, 7,702; Delaware, 7,194; Virginia, 6,606. Sussex County, Delaware, has the largest county acreage, with 6,404 acres in 1909.

There are several serious fungous diseases and insect pests of the strawberry. White grub is controlled by avoiding newly plowed sod land when setting the bed; weevil, by planting largely of pistillate varieties or profuse-blooming staminate sorts; leaf-roller, by spraying with arsenate of lead, and burning the leaves; root-louse, by setting clean plants in clean land. The several types of leaf-blight (Fig. 3726) may be prevented to a considerable extent by spraying with bordeaux, but it is more practicable to plant resistant varieties. The fundamental treatment of all these is to fruit the bed but once, or at most but twice, and to grow succeeding crops on other land, cleaning up the old plantation thoroughly after the last fruiting. Short, quick, and sharp rotations and clean culture do much to keep all enemies in check.

The American book writings on the strawberry are: R. G. Pardee, "A Complete Manual of the Cultivation of the Strawberry," New York, 1854, and subsequent editions; A. S. Fuller, "The Illustrated Strawberry Culturist," New York, 1862, and subsequent editions; J. M. Merrick, Jr., "The Strawberry and its Culture," Boston, 1870; Charles Barnard, "The Strawberry Garden," Boston, 1871; T. B. Terry and A. I. Root, "How to Grow Strawberries," Medina, Ohio, 1890; L. J. Farmer, "Farmer on the Strawberry," Pulaski, N. Y., 1891; A. F. Wilkinson, "Modern Strawberry-Growing," 1913. Aside from these writings, the strawberry is well treated in various books devoted to small-fruits and to fruit in general, and in the horticultural periodicals. S. W. FLETCHER.†

Strawberry-growing in the South.

The strawberry is by far the most important small-fruit grown in the South, being raised commercially in every state. The industry is more concentrated in the South than in the North. This concentration is probably due to the fact that nearly all of the strawberries are shipped by freight to distant markets. The strawberry industry in the South has developed as an independent unit, or as an adjunct to truck-growing rather than in connection with other fruit-growing enterprises.

An important consideration in growing strawberries for northern markets is the selection of a location where the soil and climatic conditions are conducive to early ripening of the fruit, so that there will be little competition from regions farther north. In many southern sections where strawberries are grown on a commercial scale, shipments practically cease as soon as berries from a more northern location begin to move in car lots. This is due to the fact that toward the end of the picking-season the berries are small and cannot compete successfully with the larger fruit from a region nearer the market that is just beginning to harvest its crop.

While strawberries are grown on nearly all types of

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soil in the South, sandy and gravelly loams are considered best. A warm quick soil, although poor, is preferable to a heavy retentive soil well supplied with plant-food. Plant-food can be supplied by the addition of fertilizers, but the physical condition of the soil can be modified only with difficulty and loss of time by cultivation, drainage, and the addition of humus. The soil for strawberries should be well supplied with humus in a well-decomposed state. Many growers think that new land is essential for good results, but when old soils are well supplied with organic matter they will yield as large crops as new soils.

Few soils in the South that are adapted to strawberry-growing are rich enough to produce large crops of fruit without the addition of fertilizers. Stable or barnyard manure is the best fertilizer for strawberries as it supplies both humus and plant-food. It is best, however, to apply the manure to the crop preceding the strawberries in order that it may become well-decomposed, and so that most of the weed seeds will have germinated.

When manure is not available, commercial fertilizers are applied in large quantities, but these should be used in connection with green-manure crops such as cowpeas, soybeans, velvet beans, vetch, and clovers. Some growers use as high as one ton, or even as much as a ton and a half, of commercial fertilizer to the acre. However, under most conditions, 1,000 to 1,500 pounds of a fertilizer analyzing 2 to 3 per cent of nitrogen, 6 to 8 per cent of phosphorus, and 6 to 8 per cent of potash, should be sufficient. On land where legumes have been grown, a part of the nitrogen may be left out. It should be borne in mind that large applications of commercial fertilizers are profitable only when used on soils in good physical condition, and well supplied with humus.

There are three systems of growing strawberries in the South: the hill system, the hedge-row system, and the matted-row system.

In the hill system the plants are set separately, one plant in a place, and no new plants are allowed to form. The plants are set 12 to 14 inches apart in rows 3 to 3½ feet apart. This makes a large, vigorous plant, producing large uniform berries which ripen evenly. This system is followed in Florida. The quantity of berries produced is not so large as under the other systems, but the quality is better and the percentage of first-class berries larger.

In the hedge-row system the plants are set 10 to 18 inches apart in rows 3 to 3½ feet apart, and runners are allowed to form plants along the row in a strip a few inches wide. This system is practised in the southern part of the lower tier of southern states, with the exception of Florida, where the hill system is used.

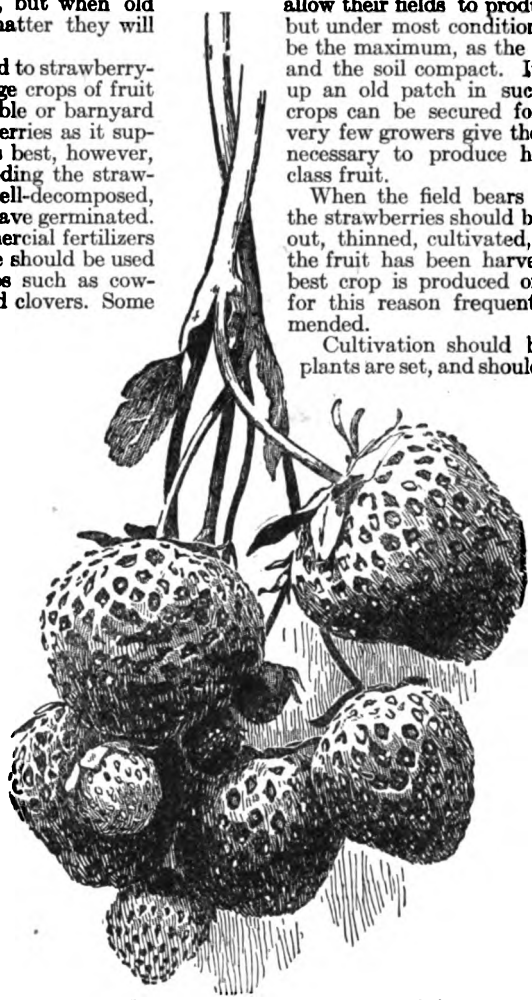
In the matted-row system the plants are set 15 to 18 inches apart in rows 3½ to 4 feet apart. The runners are allowed to form plants 6 to 9 inches on either side of the row. Sometimes the plants are allowed completely to cover the ground. This system probably produces the largest crop of berries, but the fruit is usually smaller and does not ripen so well as under the other systems.

Strawberries are planted in Florida any time from June to November, whenever the soil and climatic conditions are favorable. In other southern sections of the South Atlantic and Gulf Coast states, the plants are set in late summer or autumn. In all other sections of the South, the plants are usually planted in late winter or early spring, and no crop is allowed to be produced the first season.

The length of time that a field should be allowed to produce fruit depends upon many conditions and varies in different parts of the South. In sections where weeds and grass grow very rapidly and where the picking-season is long, as is the case in the lower South, usually only one crop is grown. In the upper sections of the South, two or more crops are produced. Some growers allow their fields to produce five or six crops, but under most conditions two crops should be the maximum, as the fields become weedy and the soil compact. It is possible to clean up an old patch in such a way that large crops can be secured for several years, but very few growers give the fields the attention necessary to produce heavy crops of first-class fruit.

When the field bears more than one crop, the strawberries should be thoroughly cleaned out, thinned, cultivated, and fertilized after the fruit has been harvested. As a rule, the best crop is produced on new plantings and for this reason frequent renewal is recommended.

Cultivation should begin soon after the plants are set, and should be continued whenever weeds start or a crust forms. Frequent shallow cultivation will make it unnecessary to do much hand-hoeing or hand-weeding. A cultivator which merely breaks the surface without disturbing the roots is to be preferred. Any weeds which interfere with the development of plants or fruits during the picking-season are pulled by hand, or cut off with sharp hoes.



3723. Bomba strawberry. (Nearly natural size)

In most sections of the South, some form of mulch is used to hold moisture during the picking-season when the soil is not stirred, to keep the berries clean, and to prevent "heaving out" in regions where freezes occur. The materials used for mulch are pine straw, oat, wheat, or rye straw, leaves, and marsh hay. These materials are of value as humus when turned under. In sections where freezes do not occur, the mulch is usually applied in late winter.

For best results in growing strawberries a good system of rotation should be followed. In any system of rotation, a leguminous crop should be turned under once in three or four years, and a cultivated crop grown on the area the season before the strawberry plants are set. The following system of rotation is a good one for the South:

1. Strawberries one or two years, followed by cowpeas after the strawberry plants are plowed under.
2. Early vegetables followed by cowpeas or late vegetables.
3. Corn with cowpeas between the rows. The corn stubble and the cowpeas should be turned under for

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strawberries the following year, in case the plants are set in the spring.

In sections where vegetables are not grown commercially, oats may follow the cowpeas turned under the second season.

The varieties of strawberries grown in the South are Klondyke, Missionary, Lady Thompson, Excelsior, Aroma, Gandy, Chesapeake, and Early Ozark. In the lower sections of the South, the Klondyke and Missionary are grown more than all others. For a succession of crops the Excelsior or Early Ozark may be grown for early fruit, the Missionary, Klondyke, and Lady Thompson for medium, and the Aroma or Gandy for late ripening. In the upper sections of the South, the Early Ozark, Chesapeake, Klondyke, Aroma, and Gandy are all grown, but very rarely does any grower raise more than two varieties for commercial purposes.

3724. Belmont strawberry. (Natural size.)

As a large part of the strawberries grown in the South are shipped to distant markets, they must be picked before they are fully ripe. For long distances the berries should be fully grown and about three-fourths ripe. When picked before they are at all colored the berries will shrink and wither, making them unfit for sale.

The berries should be well graded and packed before being shipped. When experienced pickers are employed the best results can be secured by grading the berries in the field, as they are picked, so as to avoid rehandling and the consequent bruising and deterioration of the fruit. The common practice, however, is for expert packers to do the grading and packing in a packing-shed to which the fruit is delivered by the pickers. The top layer of berries should be placed so as to hold them in place, but care should be taken not to put small inferior berries in the center and large berries on top. All types of berry boxes are in use in the South, but the tendency is toward a standard full-size quart box. In some sections of the South, particularly in Louisiana, pint boxes are used for the early shipments. The fruits carry better and the price received is higher; later in the season as fruits become more abundant and the price is lower, fruit from these same regions is shipped in quart boxes in crates holding twenty-four or thirty-two quarts. A long narrow box is objectionable.

Berries which are well graded and sorted and put in clean, neat, attractive packages of standard sizes command the highest price and sell most readily. The type of crate depends upon the boxes used. Any crate that is substantially built and well ventilated is satisfactory, but the cost is an important consideration, as they are not returned to the shipper. The largest crate that can be handled conveniently is the one to use, as the large ones are cheaper in proportion to the quantity of berries they carry. The twenty-four- and thirty-two-quart crates are in most common use, although in some sections the sixty-quart crate is employed. Crates with hinged lids have the advantage that they can be opened easily and quickly, and as a result invite inspection. A large part of the Florida crop is packed in quart boxes which are placed in pony refrigerators for shipment to northern markets.

The cost of growing strawberries in the South is from $75 to $150 an acre, divided about as follows:

Interest on investment (land and equipment)	$8 00	to	$15 00
Preparation of land	5 00		10 00
Manure or fertilizer	10 00		25 00
Plants	10 00		20 00
Setting plants	8 00		12 00
Cultivating and hoeing	20 00		35 00
Mulching	15 00		25 00
Total for growing	$76 00	to	$142 00
Picking, grading, and packing 2,000 quarts	$40 00	to	$70 00
Crates and boxes	20 00		25 00
Hauling to station, loading, etc.	5 00		10 00
Total for picking, packing, grading, etc.	$65 00	to	$105 00
Total for growing	76 00		142 00
Grand total	$141 00	to	$247 00

The lower estimate is about the average for most sections of the South, while the higher figures cover the extreme cost. The average cost in Florida is between the two estimates, but nearer the higher.

H. C. Thompson.

The strawberry in California and northward.

California conditions include both those most favorable and most trying for the growth of strawberries. There are situations where, through local topography and proximity to the ocean, winter temperatures are very seldom too low for the growth and fruiting of the plants and where, by summer irrigation to maintain this continuous activity of the plants, it is possible to gather fruit every month in the year. This fact is not, made of much commercial account, however, nor is it widely true that one can have strawberries all the year round in the open air. It is true, however, that even on the lowlands, where the commercial crops are chiefly grown, the winter is so mild that strawberries begin to ripen in shipping quantities as early as March and by proper cultivation and irrigation the fruiting is continued until late in the autumn, and the grower has therefore a very short closed season. The trying condition for the strawberry is found in the long dry summer, which enforces dormancy as early as June on light loams in the more arid localities of the interior. Such soils become dry and hot to a depth of several inches in spite of surface cultivation and cause the dwindling and death of a shallow-rooting plant like the strawberry unless frequent irrigation is begun in time. This trouble is less acute on more retentive soils in regions of lower summer temperature and greater rainfall, and plants in such situations may survive the summer dormancy, but it is true that everywhere in California and even in the more humid states on the north that strawberry-grow-

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ing without irrigation results either in failure or only partial satisfaction and the venture is seldom to be commended. It is usually so easy, however, to secure the small amount of water necessary for home production, and the plant when fairly treated is so highly productive, that a general exhortation to strawberry-growing on an irrigation basis is fully warranted.

3725. Shuster (Gem) strawberry. (×½)

There are several species of strawberries indigenous to California, and they are of both littoral and alpine types. Albert F. Etter, of Ettersburg, Humboldt County, California, has worked continuously with these species for more than twenty-five years, by selecting seedlings, and by crossing the species among themselves and with the leading cultivated varieties. He has established an Ettersburg group of new varieties, which for vigorous growth of plant, resistance of drought and true everbearing habit are very notable. Some of them have strictly evergreen foliage under California conditions. For abundant fruiting and for firmness of fruit, some of these varieties have shipping and canning characters new to the strawberry. Etter describes his work in detail in the Pacific Rural Press of San Francisco for March 4, 18, and April 1, 1916.

The varieties chiefly grown in California are different from those popular at the East. New varieties from the eastern states and from Europe are freely tried, but few are successful and they retain local popularity after abandonment in their birthplaces. A striking instance of this fact is the continued popularity of Longworth Prolific, Sharpless, Monarch of the West, Wilson, Albany, and the like. Longworth has survived more than fifty years' continued growing. Other popular varieties are Melinda, Jessie, Dollar, Brandywine, Marshall, and Lady Thompson. Brandywine (Fig. 3730) is the most widely approved variety in the state and is standard in southern California, Excelsior and Klondyke standing next in popularity as early varieties, and Americus and Iowa as autumn-fruiting varieties. In the central regions of the state, the Dollar and Marshall lead among the newer kinds and the Banner is exclusively grown by some producers for the San Francisco market. Jessie and Dollar are largely grown for shipment to interior states and to the northern coast before the local fruit ripens.

3726. Leaf-blight of strawberry. (×½)

The growth of strawberries is almost wholly in matted rows, the rows usually occupying low ridges only sufficiently elevated to allow the slightly depressed intervals to serve as irrigation ditches and as walks during picking. The slight elevation of the plants also assists in surface drainage, when heavy rains fall during the early part of the fruiting-season, and this promotes early growth and fruiting of the plants. Where the soil is too coarse to permit free rise of water from the depressed ditches, the conditions are reversed and low levees are made to inclose blocks of plants which are irrigated by flooding the inclosures. In the chief commercial regions a fine loam is used and irrigation from the small ditches on both sides of the ridges, which are about 2 feet wide, is the ruling method. Nearly level land is selected and grading is done before planting to reduce dry knolls and fill low places so that the water will flow slowly and will evenly moisten the whole field. Subirrigation by tile has been often advocated but never has been employed to any extent.

One of the chief strawberry-shipping districts in central California is characterized by a shallow loam underlaid by an impervious indurated clay or hardpan, which prevents the percolation of the irrigation water and enables growers to maintain a large acreage by means of the small water-supply secured by windmills. In this case water is applied very frequently, even oftener than once a week in some cases, but the total amount for the season is small. Quite in contrast to this is the growth on light deep loams where water sinks so rapidly that the plants suffer, although water is almost constantly running in the ditches. In such cases mulching and sprinkling are the price of success, and these are too costly except on a small scale for home supply. The largest producing districts have soils midway between the extremes above noted, viz., deep retentive loams, situated rather low in the valleys and with irrigation available either by ditch system or by wells both flowing and pumped. The pump wells require usually only a short lift, and abundant water is secured cheaply by the use of modern pumps and motors.

3727. Fancy packing of strawberries, each quart wrapped in paper; a picking-stand on the left.

In addition to supplying the home markets, which are very good, California strawberry-growers find a good outlet for the fruit all through the region west of the Missouri River. Southern California supplies the southern portion of this district, while the growers in central California, chiefly near Florin in Sacramento County, make large shipments eastward as far as Colorado and northward to all the great interior states and to Oregon,

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Washington, and British Columbia before the locally grown fruit in those regions is available.

The states of Oregon and Washington in their areas lying west of the Cascade Mountains have conditions excellently suited to the growth of the strawberry. Their conditions more nearly resemble those in the eastern states than any other part of the coast. The cooler weather and more abundant moisture give a better spring season than that of California, but the season is on the whole much shorter because of the longer winter. Irrigation is also necessary in most places for continued fruiting during the summer. The most famous district is Hood River, Oregon, where arid conditions east of the Cascade Mountains are modified by western influences which reach through the gap in these mountains where the Columbia River flows through. Irrigation is regularly employed and a large commercial product grown. The varieties chiefly grown in this region and in adjacent parts of Washington and Idaho are of local origin, the Hood River (Clark Seedling) and Magoon being widely approved. Jessie, Sharpless, Wilson, Haverland, Crescent, Cumberland, Jucunda, and Parker Earle are also commended by growers in the northwestern states.

E. J. WICKSON.

Cultivation of the strawberry on home grounds.

Of all the fruits which can be grown in the garden, the strawberry offers to the amateur the greatest inducements on account of ease of growing, delicious quality, long season and comparatively quick-bearing habit, and wide geographical range. No garden should be without this important fruit. It can be grown in almost any soil and in so many different ways that even in a most crowded garden some space may be found for it.

The strawberry thrives best in a sunny location but will also do well in partial shade like that from small-fruit bushes or young fruit-trees. Heavy shade draws the vines up, and while a luxuriant growth of foliage ensues there will be but little fruit. On the other hand southern slopes where the berries are exposed to the unbroken rays of the sun will result in scalded fruit unless some artificial protection can be given.

The location of the strawberry-bed in the garden is very important and should be governed to a large extent by the other crops. Remembering that the strawberry will occupy the land for at least two seasons, such tall-growing crops as corn, pole beans, or asparagus should not be planted too near. Soils often govern location to a great degree. While the strawberry will thrive in almost any soil it is better to choose one which has good water-holding capacity, for although the strawberry will make splendid plant growth in light soil the fruit will not be so good or large if there is a lack of water at the fruiting-season. While artificial watering may be practised, it is often done at the expense of quality in the fruit. Soils may be easily improved. A light soil can be well filled with manure or humus of some sort, and a heavy soil drained with tile. If possible the land should have a slight slope to turn off surplus water in the winter, but if this is impossible, be sure that the bed is not placed in a depression where water collects during the winter.

3728. A prolific row of strawberries, the fruit resting on a mulch.

3729. Strawberry-field grown in matted-row system.

The preparation of the soil is very important, for a finely rooted plant like the strawberry needs soil well pulverized and free from clods of earth. The land should be planted at least one year with some crop which will require good cultivation. Avoid planting on sod land or land where witch-grass and perennial weeds are abundant. Spading to a depth of at least 1 foot and mixing through the soil a good liberal amount of well-rotted manure will be good preparation for the strawberry-bed. There is, however, on soil naturally rich in nitrogen, danger in putting on too much manure, as an excess will often produce foliage but not fruit. Other fertilizers should be added during the season as the plants grow. Mixed fertilizer should contain about 5 per cent of nitrogen, 10 per cent of phosphoric acid, and from 5 to 6 per cent of potash. All of the artificial fertilizers should not be applied at one time. It is best to make at least three applications during the season as the plants grow and the amount will be governed by the growth of the plants. Artificial fertilizers should not be spread on the foliage. Generally speaking, one pound of the mixture given above in three applications should be ample for six plants during the growing season.

Having prepared the ground as outlined, the next question to settle is the system under which to grow the bed. There are three systems which may be used for the garden strawberry-bed: the wide matted-row, the hedge-row, and the single-hill systems; and as the plan of a system depends very much on the variety grown it will be necessary to consider variety in this connection. In the selection of varieties for the home-garden, the following conditions should be carefully considered: quality, attractiveness of the fruit, productiveness, vigor of plants, season. Many very productive varieties lack quality and attractiveness while as a rule the quality berries are not good commercial varieties and it is often difficult to procure the plants of the better varieties in the nursery.

As it is practically impossible to obtain all of the points outlined above in one variety, it is generally best to plant at least three, not alone to insure a longer season but variety in the fruit is very essential; also some years one variety alone does not do well while with a number of varieties some are sure to succeed. This will be found especially true when late spring frost may entirely ruin one variety and not injure another.

Vigorous-growing varieties with good clean-growing

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foliage should be chosen. Such varieties are generally to be relied upon. In choosing varieties one should secure those which do well in one's vicinity, for in some cases quality in a variety depends to a large degree on environment.

It is always best to plant at least three varieties so that a long season will be assured. While it is impossible not to have varieties overlap, an abundance at one time during the season is no detriment, for at this time preserving may be done and there are so many ways in which strawberries can be used that an abundance should be sought.

The strawberry is bisexual in its bloom and therefore it will be necessary either to choose varieties which have perfect flowers or have those of both sexes in order to insure perfect pollination. Sex in strawberries does not seem to have any direct bearing on quality or productiveness, although there is a common fallacy that pistillate varieties are most productive and staminate varieties of the better quality.

In the matted-row system of planting, the plants are set 4 by 2 feet apart, and allowed to run so that a row from 2 to 3 feet wide is formed. This is probably the easiest way in which to grow the strawberry. There is great danger, however, that too many plants will be allowed to grow in this system and, in consequence, through overcrowding, the fruit will be small and rather poor. In this system plants should not be allowed to set closer than 6 inches apart and all runners which are made beyond those necessary to cover the ground when at this distance should be removed.

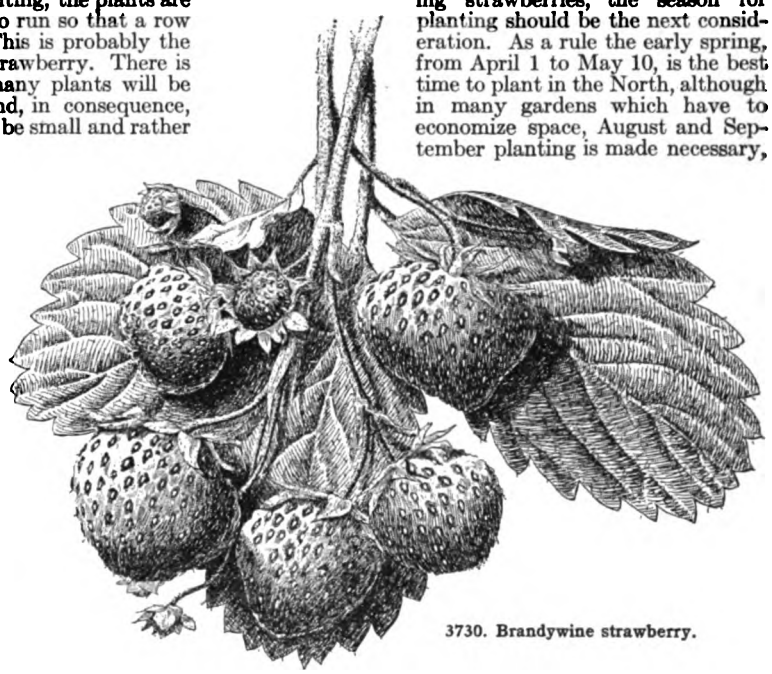
In the hedge- or narrow matted-row system, set plants 3 by 2 feet apart, and allow each to make four or six new plants, which are set so that there are practically three separate rows with the plants in the row about 8 to 10 inches apart. All other plants and runners are removed.

In the hill system, the plants are set in various ways, first in straight rows, 3 feet apart, and the plants in the row from 12 to 20 inches apart, or plants are set in beds 14 by 14 inches or 18 by 18 inches or even 20 by 20 inches apart, and from three to four rows are set, depending on the variety. In this system all of the runners are removed from the parent plant and the bed is generally allowed to remain for about three years.

To obtain strawberries earlier they may be raised in frames as other perennials are grown. The plants are set in August or September about a foot apart in rich garden loam and given good cultivation. The frames should not be more than 8 inches deep. Hill culture is practised in this system and plants are protected during the winter by a light mulch. Glass frames are put on early in March, careful cultivation given, plenty of air and careful watering. This method will advance the crop two to three weeks ahead of the outdoor crop. Such varieties as are suitable for greenhouse culture should be used for growing in frames.

Growing strawberries in a barrel, or rather on a barrel, is practised by those who have very limited space, and while there are many drawbacks to doing this successfully it can be accomplished with care. A clean cider barrel should be used and several 1-inch holes bored in the center of the bottom and a ring of 1½-inch holes about 8 inches apart around the barrel with a space of 8 inches between the rows of holes. If the holes are started near the bottom, it will be possible to get three rows of holes and about eight holes around the barrel. Good strong pot-grown plants should be secured and a good compost of garden loam. Place in the barrel and over the holes cut in the center of the bottom a piece of 6-inch drain-tile about a foot long, filling the center of the tile with coarse gravel or small stones. Put the roots of the plants into the 1½-inch holes in the sides of the barrel and fill the barrel with the compost, adding pieces of tile to that in the center as the barrel is filled so that the drain-pipe comes up to the top of the barrel. A row of plants may be planted on the top of the barrel so that sides and top are covered. Watering should be done through the drain-pipe and if the coarse material used inside the drain is satisfactory, the plants will take up about the proper amount of water before it all passes through the barrel. The barrel should be carefully protected in winter by covering with straw and pine branches and the top protected so that excessive rain will not get in; elevating the barrel on stones will help the drainage.

Having decided upon the method or system of growing strawberries, the season for planting should be the next consideration. As a rule the early spring, from April 1 to May 10, is the best time to plant in the North, although in many gardens which have to economize space, August and September planting is made necessary,



3730. Brandywine strawberry.

as the strawberry has to follow some of the other early crops, as peas, beans, lettuce, and the like. For August or September setting, pot-grown plants are better than the runner plants unless one can take runner plants directly from one's own bed and transplant them under favorable weather conditions.

To obtain the best pot-grown plants, the runners of the current season's growth should be used, as these make better plants than those of last season's growth which have been placed in cold storage and potted after their natural season of planting has gone by. If layer plants are used in spring, great care should be taken in planting so that the plants may be assured of a good start. Remove practically all of the foliage and cut back the roots at least one-half. If the ground has been prepared carefully the hand may be used in making the hole for the roots, but in stony ground it is best to use a trowel. Be sure that the crown of the plant is not set either too deep or too far above ground. The crown should be on a level with the surface of the soil. When setting, spread the roots out fan-shape and be sure to press the soil firmly about them. Be sure that the rows are straight. Various devices are used on commercial

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farms but for garden culture nothing is better than a line for securing straight rows.

Whether set in spring or fall, cultivation of the soil should begin as soon as the plants are set and kept up until late September, when cultivation should cease and the plants given a chance to harden up for the winter. Cultivation, whether done by wheel-hoe, hand-hoe, or weeder, should be shallow, never more than 2 inches deep, as the strawberry roots are near the surface and light cultivation of the surface soil does as much good as any other form. Weeds of all kinds should be kept down and comparatively little weeding will be necessary provided the ground is kept stirred.

3731. The forcing of strawberries under glass.

During the summer at least three applications of fertilizer should be made, preferably before or during a rain. If the fertilizer mentioned previously cannot be obtained, bone-meal will give good results, particularly if wood-ashes are added.

If the season is particularly dry or the land is inclined to dry out rapidly, artificial watering may be practised, but it is better not to use water if it can be avoided. Plenty of cultivation will grow good plants on nearly all soils.

In the late fall after heavy frosts have come and the ground freezes slightly at night, it will be necessary to put some winter protection on the strawberry-bed. Many kinds of materials may be used, but first it is best to have a light mulch of well-rotted stable-manure scattered among the plants and worked under the foliage. Following this the winter protection may be put on. This should be of coarse hay, cornstalks, or very strawy manure, care being taken not to put on too much. A good rule to follow in placing a covering is that it must not be too close to prevent seeing some of the foliage of the strawberry plants under the mulch. The mulch may be held in place by brush, light cordwood or even soil, and in places where there is little snow great care must be taken to keep the mulch in place. It must be borne in mind that this careful protection is not to prevent the ground from freezing but rather to prevent the alternate freezing and thawing of unprotected ground in winter. In the spring as soon as danger from extreme frosts is past, the material for holding the mulch in place should be removed and also a part of the mulch itself, leaving some of the covering on the land to serve as protection to the fruit in the fruiting-season and to keep the soil moist. Some persons prefer to remove all the mulch and to cultivate the ground, and in some cases this is desirable; but, when the plants have had good culture the previous year it is just as well not to do much cultivating in the spring. Fertilizers should be added at this time, preferably bone-meal and wood-ashes mixed at the rate of one-half pound of ashes to one pound of bone-meal and put on about one-eighth pound to the square foot.

If the weather is dry and the soil more or less inclined to dry out, water may be added at this time and up to the time the fruit is well set, being careful not to water during the daytime when the sun is shining. The question of watering strawberries is a very difficult one as so many conditions enter into the discussion. Some soils are naturally moist, and when water is added artificially to these, the tendency is for the plants to go to foliage or soft fruit or decayed berries. Too much water on a dry soil, particularly if added as the berries are coloring, is likely to injure the quality of the fruit while increasing the size, so that quality often is sacrificed to bulk. Generally speaking, in most seasons, if the land has been well cultivated the season before and the bed has been well mulched, there will be enough moisture in the land to carry the crop to maturity.

As quality in the strawberry depends very much upon ripeness and condition, it is well not to begin to pick too soon, but wait until the fruit has colored all over and has taken on the characteristic depth of tint which may be common to the variety. Be sure to pick the fruit early in the morning before the sun gets hot, keeping what berries are not used early in the day on ice. Pick the fruit with a stem; and for household use berries are much more attractive when picked in a shallow basket with some kind of foliage.

Within the past few years a new race of strawberries has been developed commonly called everbearing from their habit of producing fruit after the regular strawberry season has passed. This strain has now been permanently established and it is a great source of satisfaction to strawberry-lovers to have fruit after the regular season is over. There are several varieties of these everbearing strawberries, and every garden should have a few of them. They may be planted in any of the ways suggested for the regular varieties but they should have plenty of water during the summer to insure the full development of the fruit. In most locations in the northern states these varieties begin to ripen early in August and continue until heavy frosts. It is advisable to cut off the blossoms in May if a large crop is wanted in August, but they will fruit at both times after a short rest in July. Many of these varieties have a tendency to make too many plants and it is well to follow the same general directions as given for growing the standard varieties. Most of these everbearing varieties do very well in the usual hill culture.

WILFRID WHEELER.

Forcing of strawberries. (Figs. 3731, 3732.)

The forcing of strawberries for a winter crop has not as yet become of any great commercial importance in North America. Some gardeners grow a few potted plants for either Christmas or Easter decoration. Very few, if any, commercial growers are forcing strawberries exclusively to any profitable extent. The few strawberries that are forced are grown either in pots or planted out on benches. The former method is the one generally employed. There are several good reasons for this, some of which are: first, the confinement of the roots; second, the ability to ripen the crowns in the fall; third, the control of fertilizers and liquid manure; fourth, the privilege of having the crop grown in several houses at one time or brought from a coolhouse into heat; and fifth, the opportunity to supply particular demand of the potted plants or their fruits. The first expense of the pot method is considerably more than when the plants are grown in the benches, but after

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the pots are once purchased the cost of each method should be about the same.

The pot method as practised at Cornell University is about as follows: As early in the spring as possible large plants are set in well-enriched soil. The first strong runners made by these plants are secured and potted. Numerous 2- or 3-inch pots filled with good soil are plunged to the rim along the strawberry row. The runners are trained to these pots, and a small stone is placed on each runner to keep it from growing beyond the pot. When the pot is filled with roots the young plant is cut from the parent stock, the pots lifted and taken to the potting-shed or other convenient place, where they are at once shifted into the fruiting-pots (usually a 6-inch pot). The soil used at this time should be three parts fibrous loam and one of good sharp sand. This potting-soil should have mixed with it bone-flour or dissolved rock at the rate of about one pint to two bushels of soil. Ample drainage should be given, as through the season of ripening the crowns and the following forcing-period, a large quantity of water must be given and none should be allowed to stand around the roots.

The pots should then be plunged to near the rim in some coarse material, preferably coal-ashes, which, if deep enough to extend from 4 to 6 inches below the plunged pots, will prevent the earthworms from entering the pots. The use of a frame in which to plunge the pots is recommended for protection against heavy rains or early frosts. Attention to watering is all that will be necessary through the growing season. Late in September or early in October the pots will be filled with roots and the plants will have attained their full growth. At this time larger and firmer crowns will be had by careful attention to watering and subsequent drying off to almost the wilting stage than by watering the plants up to the time of freezing weather. The drying process seems to represent the late fall season and causes the plant to store up material in the crowns at an earlier period. At the coming of cold weather the soil in the pots may be allowed to freeze. It is very desirable that the soil be on the dry side before freezing, for if the ball of earth is wet there is danger of breaking the pots when the cold becomes intense. The period of forcing,

3732. A good winter strawberry plant in bloom.

from the time the frozen plants are brought in until the ripening of the fruits, will be about eight weeks. The time will vary slightly under different conditions of heat and sunlight. When first brought in, the plants should be cleaned of all dead or diseased leaves. The pots should be plunged to near the rim in some material that will retain moisture, e. g., tanbark or coal-ashes. The benches or shelves should be as near the glass as convenient. A thorough spraying with bordeaux mixture or some other fungicide should be made at once. For the first few days the house should be held at about 35°, with little if any rise through the day. After a week a rise of 10° may be given. At the end of the second week 50° at night, with a rise of 10° to 15° through the day, will be about right.

Strict attention must be given to syringing the foliage every pleasant day. Keep the walks wet until the time of blossoming. This moisture keeps down the red-spider. At blossoming time the house should be allowed to dry out, and a free circulation of air should be maintained through the middle of the day, in order to ripen the pollen. It is necessary to pollinate each flower by hand. The pollination may be done in the middle of the day while the houses are dry. A small camel-hair brush is useful for distributing the pollen. A ladle or spoon should also be provided in order to carry the surplus pollen. The surplus pollen may be used on varieties that are pistillate or do not have pollen enough to set their own fruits. Six to eight fruits are enough for a 6-inch pot. When these are set the remaining flowers should be cut off, in order that the entire strength of the plant may go to swelling the chosen fruits. After swelling begins, liquid manure should be given. During the first week give one dilute application. After this give two applications a week, increasing the strength of the manure liquid each time. Well-rotted cow-manure or sheep-droppings furnish good material for this purpose. When the fruits are coloring the liquid manure should be withheld and only clear water given. As they swell, the fruits will need support, and the best method of furnishing this is probably by using small-meshed window-screen wire cut into suitable squares. These squares may be laid on the pot, under the clusters of fruits. They hold the fruits away from the sides of the pots, protect them from any water or liquid manure that is given the plants, and enhance the beauty of the potted plant. After one fruiting, the plants are worthless.

C. E. HUNN.

STRAWBERRY BUSH: *Evonymus americana.* **S. Geranium:** *Saxifraga sarmentosa.* **S.-Raspberry:** *Rubus illecebrosus.* **S. Tomato:** *Physalis Alkekengi* and other species of *Physalis.* **S. Tree:** *Arbutus Unedo.*

STRELÍTZIA (for the wife of King George III, Charlotte Sophia, of the family Mecklinburgh-Strelits, a patron of botany). *Musàceæ.* BIRD-OF-PARADISE FLOWER. Perennial herbs, adapted to the warmhouse, grown for the banana-like foliage and the very odd showy flowers.

Rhizome sometimes subterranean, sometimes an erect woody st.: lvs. large, long-petioled: scape terminal or in the upper axils, short-exserted from the sheaths of the lvs.: bracts large, spathe-like, boat-shaped, acuminate, solitary at the end of the scape or 2 slightly distant: perianth long-exserted; sepals free, long, carinate; petals very dissimilar; stamens 5; ovary 3-celled, many-seeded.—About 5 species, S. Afr. The genus has been monographed by K. Schumann in Engler's Pflanzenreich, hft. 1 (IV. 45) 1900.

The *Strelitzia Reginæ* requires a strong soil, a copious supply of water, and considerable sunlight. It is a serviceable plant for house decoration or for the porch or lawn in summer. It will endure much neglect, but unless well cared for it may fail to bloom regularly and well. A night temperature of 50° is sufficient. This plant may be induced to set seed if the flowers are hand-fertilized. The usual method of propagation, however, is by suckers and division.

A. *Plant nearly stemless.*

B. *Lvs. ovate or ovate-oblong, margin crisped.*

Reginæ, Banks. BIRD-OF-PARADISE FLOWER. Fig. 3733. About 3 ft. high: roots large, strong-growing: lvs. oblong, about 1 ft. long, stiff, concave; lf.-stalks all radical, 2–3 times as long as the lvs.: scape higher

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than the lvs.: spathe about 6 in. long, nearly horizontal, purplish at the base, about 6-fld., the fls. orange and blue-purple. Winter. B.M. 119, 120. G.C. III. 54:86. Gn. 60, p. 412; 76, p. 168. Gn.W. 23:185. R.H. 1909: 308. Var. **citrina**, Hort., is cult. abroad. Gn. 78, p. 30.

BB. *Lvs. linear-lanceolate, margin flat.*

parvifòlia, Dry., is at once distinguished by its linear-lanceolate lvs. with an equal base and flat margin. S. Afr.—The species is probably not cult. Var. **júncea**,

3733. Strelitzia Reginæ. (×1/4)

Andr. (*S. júncea*, Link), has lvs. with practically no blade: spathe green margined with magenta, sepals orange, petals rich blue, white-tipped. S. Afr. B.R. 516. R.B. 29, p. 184.

AA. *Plants with finally tall woody sts.*

B. *Base of lvs. cordate: interior petals white.*

augústa, Thunb. (*S. angústa*, D. Dietr.). Becoming 18 ft. high: lvs. at the summit of the st. 2–3 ft. long, oblong, acute; petiole 4–6 ft. long: peduncle short, from a leaf-axil: spathe deep purple: fls. on short purple pedicels, all parts of the fl. pure white; petals round at the base. B.M. 4167; 4168. G.C. III. 35:402.

kewénsis, Hort. (*S. augusta* × *S. Reginæ*). Plant about 5 ft. high: lvs. as in *S. augusta* but the blades 2 x 1¼ ft.: fls. vertical, pale watery yellow, more resembling those of *S. Reginæ*, but the small hooded petal is more like the other parent as are the lilac-pink patches at the base of the sepals. Garden hybrid. G.C. III. 47:217; 54:87.

BB. *Base of lvs. obtuse: interior petals blue.*

Nícolai, Regel & C. Koch. Resembling *S. augusta* in habit and foliage, but the fls. and spathe are much larger and the petals are hastately combined and blue in color. B.M. 7038. F.S. 13:1356. Gt. 7:235.

F. TRACY HUBBARD.†

STREPTÓCALYX (*twisted calyx*). *Bromeliàceæ*. There are 7 species of Streptocalyx, according to Mez (DC. Monogr. Phaner., vol. 9), of Brazil. The genus differs from Bromelia in having strongly imbricated broad sepals and long corolla-tube. No species are in the American trade, but *S. Fürstenbérgii*, Morr., is described in horticultural literature (sometimes as *Æchmea Fürstenbergii*, Morr. & Wittm.). It is a stemless pineapple-like plant, with 30–40 rigid lanceolate lvs. in a dense rosette: cluster a central dense panicle 1–1½ ft. long, with many 2-sided spikes of rather dull fls. *S. longifòlius*, Baker (*Bromèlia longifòlia*, Rudge), has densely rosulate lvs. 3–6 ft. long, vaginate at base, spinulose at apex and margin, dark-colored on the edges, scaly. Guiana.

STREPTOCÁRPUS (Greek compound, meaning *twisted fruit*). *Gesneriàceæ*. CAPE PRIMROSE. Herbs, frequently villous or lanate, adapted to greenhouse culture; choice plants, grown for the showy bloom.

Stemless, with 1 or more spreading radical lvs. or rarely with a st. and opposite lvs.: peduncles scape-like or axillary, sometimes 1–2-fld., sometimes cymose, several-fld.: fls. pale purple or blue, showy; calyx 5-parted; corolla-tube elongated, cylindrical or spreading above, limb obliquely 2-lipped, posterior lip 2-cleft, anterior larger, 3-cleft; perfect stamens 2; disk short-annular; ovary superior, imperfectly 4-celled: caps. linear, terete, splitting in 2, rarely 4 valves.—About 60 species, natives of S. Afr. and Madagascar. In Oct., 1826, there bloomed at Kew a most interesting gloxinia-like little plant, seeds and specimens of which had been collected in S. Afr. by Bowie, on the estate of George Rex, at Knysna. The plant was described as *Didymocarpus Rexii*. It is a stemless plant, with 1 or rarely 2 long-tubular nodding pale blue fls. on each of several short scapes, and with several clustered root-lvs. It proved to be a profuse bloomer and easy to grow. "So abundantly does it produce seed," wrote W. J. Hooker, in 1830, "that new individuals come up as weeds in the neighboring pots, and a succession of flowers may be obtained at almost every period of the year." In 1828, John Lindley made the genus Streptocarpus for this plant, calling it *S. Rexii*, the name it now bears. It appears to have been nearly thirty years after the intro. of *S. Rexii* that another streptocarpus bloomed in England. This second species was *S. polyanthus*, which may be taken as the type of a group that has one leaf lying on the ground and from the midrib of which arise successive several-fld. scapes. The intro. of this curious plant seems to have revived the interest in streptocarpuses, an interest that has been kept alive by the frequent intro. of other species. The chief stimulus to the systematic breeding of these plants seems to have been the intro. of *S. Dunnii*, said by J. D. Hooker to be "quite the monarch of its beautiful genus" (but now excelled by *S. Wendlandii*). Seeds of this species were sent to Kew in 1884 by E. G. Dunn, of Cape Town. It is one of the monophyllous section to which *S. polyanthus* belongs. In the meantime, *S. parviflorus*, a species allied to *S. Rexii*, had been intro. from the Cape region. With the three species, *S. Rexii*, *S. parviflorus*, and *S. Dunnii*, Wm. Watson of the Royal Gardens, Kew, set to work systematically to breed a new race of streptocarpus, and his efforts met with unqualified success. When the hybrids came to notice in 1887, the Gardener's Chronicle made the following comment on the value of the work: "The results are very striking, and we can hardly doubt that Mr. Watson has set the foundation of a new race of plants, parallel in importance to the Achimenes and Tydæas." Several hybrid races have now been produced and several interesting species have been intro. from the wild, so that Streptocarpus seems to be destined to become a very important and popular garden genus.

Bentham and Hooker's treatment divides the Ges-

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neriaceæ into two great tribes: Gesnereæ, with ovary more or less inferior and fruit a capsule; Cyrtandreæ, with ovary superior and fruit sometimes a berry. The latter tribe, the species of which have been monographed by C. B. Clarke in vol. V of DeCandolle's "Monographiæ Phanerogamarum," contains the genera Streptocarpus, Episcea, Cyrtandra, Æschynanthus, Ramondia, and others. Streptocarpuses are of three groups: the stemless monophyllous species, with one prostrate leaf from the midrib of which the scapes arise (this leaf is really an enlarged cotyledon, the other cotyledon not enlarging); the stemless species, with several or many radical more or less primula-like leaves (whence the English name "Cape primrose"); the stem-bearing species, with opposite cauline leaves. The cultivated species chiefly represent the first two sections. In the American trade, four specific names chiefly occur, *S. Rexii*, *S. Galpinii*, *S. Dunnii*, and *S. Wendlandii;* but since the hybrids represent several other species, these additional species are inserted in the following account. Streptocarpus is an African genus. The stem-bearing section is confined to central Africa and Madagascar, and the others to South Africa. Clarke's monograph, 1883, describes nineteen species, but *S. Dunnii*, *S. Wendlandii*, *S. Galpinii*, and many others have since been discovered.

Streptocarpuses are not difficult plants to grow. They are usually raised from seeds, the seedlings blooming in eight to fifteen months from starting. The seeds are very small, and care must be taken not to cover them too deep. Give an open sunny place in an intermediate temperature. They are not stove or warmhouse plants. Of the new hybrid forms, seeds sown in February or March should produce plants that will bloom the following fall and winter; after blooming, the plants may be discarded, for better results are usually secured from new plants than from those more than one season old. The season of most profuse bloom is summer, but the bloom continues until winter. The monophyllous species can be propagated also by cuttings of the leaf. Some fanciers of Cape primroses advise propagating select types by leaf-cuttings or by division.

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3734. Streptocarpus Rexii. (×⅓)

KEY TO THE SECTIONS.

A. *Plants of native origin.*
B. *Sts. elongated: lvs. opposite.*
Section I. CAULESCENTES. Species 1.
BB. *Sts. lacking or very short: lvs. all radical.*
C. *Lvs. several, forming a rosette.*
Section II. ROSULATI. Species 2–6.
CC. *Lvs. solitary.*
Section III. UNIFOLIATI. Species 7–12.
AA. *Plants of hybrid origin.*
Section IV. HYBRIDA. Species 13–17.

Section I. CAULESCENTES.

1. caulèscens, Vatke. Caulescent, hirsute: lvs. long-petioled, oval-oblong, entire, rather repand, apiculate, obtuse, base contracted to the petiole, puberulent above, villous beneath: fls. blue, ½in. across; calyx hirtellous, lobes linear; corolla up to nearly ¾in. long, 6 times longer than the calyx, limb strongly unequal. Trop. Afr. B.M. 6814.

*Section II. ROSULATI.

A. *Scapes 1–2-fld.*
B. *Fls. blue or mauve* ..... 2. **Rexii**
BB. *Fls. pale lavender to rosy pink or rosy mauve* ..... 3. **cyaneus**
AA. *Scapes 3- to many-fld.*
B. *Corolla-tube cylindric, nearly straight, limb slightly 1-sided.*
C. *Lvs. not decurrent on the petiole....* 4. **parviflorus**
CC. *Lvs. attenuated into the petiole.....* 5. **luteus**
BB. *Corolla-tube much curved, limb very oblique* ..... 6. **Junodii**

2. Rèxii, Lindl. (*S. Gárdenii*, Hook.). Fig. 3734. Acaulescent: lvs. several, suberect, 8 x 2 in., oblong, crenate, hairy on both surfaces: scapes several, 4–12 in. high, 2–1-fld.: calyx-lobes narrowly oblong, hairy; corolla 2 in. long, about as wide, blue or mauve, tube 1⅓ in. long, very narrowly linear-funnel-shaped, lobes a little unequal. S. Afr. B.M. 3005; 4862. B.R. 1173. L.B.C. 14:1305. F.S. 12:1214. Var. **bifiòrus,** Ortgies, differs in having stouter 2-fld. scapes. Gt. 6:204.

3. cyàneus, S. Moore. St. prostrate, slightly elongated, bearing 4 lvs.: lvs. linear-oblanceolate, narrowed below the middle into a narrow petiole-like portion, apex obtuse: scape always 2-fld.: fls. varying from pale lavender or blue to rose-pink or rosy mauve, with a few streaks of red on the 3 lower lobes and a blotch of yellow in the throat; calyx-lobes linear-oblong, pilose-pubescent; corolla about 1¼ in. long, puberulent outside. Transvaal. B.M. 8521. G.C. III. 55:31.—Allied to *S. Rexii*.

4. parviflòrus, Mey. Acaulescent: lvs. several, spreading or suberect, nearly or quite sessile, elliptic, up to 9 x 3½ in., crenate and bullate, shaggy, dark green above, nearly white beneath: scapes several, 6–10 in. high, reddish, shaggy, bearing 3–10-fld. cymes: fls. about ¾in. across; calyx glandular-pubescent, lobes narrowly oblong; corolla-tube glandular-pubescent, ⅔–¾in. long, cylindrical, obscurely widened upward, purplish outside, mouth a little oblique, lobes orbicular, white. S. Afr. B.M. 7036.

5. lùteus, C. B. Clarke. Lvs. several, petioled, elongate-oblong, 8–13 x 2–2¾ in., obtuse, attenuate at base, crenate, villous on both surfaces, almost tomentose beneath: peduncles and fls. almost as in *S. parviflorus:* corolla shorter, white, throat yellow, or almost white penciled with purple, tube slightly widened upward: caps. densely silky. S. Afr. B.M. 6636 (as *S. parviflorus*).

6. Junòdii, Beauverd. Acaulescent, cæspitose: lvs. 4–6, rugose, base attenuate, villous, veins prominent beneath: peduncles erect from the lf.-axils, pilose, 3–4½ in. high: fls. 3–6, pendulous, blue-lilac; calyx 5-parted, segms. unequal, linear, recurved; corolla hirsute outside, 1½–2 in. long, arched, limb 5-lobed,

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oblique, lobes rotund, the lower yellow-blotched at base. S. Afr.

Section III. UNIFOLIATI.

A. *Corolla-tube broader than long*..... 7. **Galpinii**
AA. *Corolla-tube longer than broad.*
B. *Fls. rose to reddish*..... 8. **Dunnii**
BB. *Fls. bluish or purplish.*
C. *Tube of corolla linear-cylindrical*... 9. **polyanthus**
CC. *Tube of corolla more or less widened at the mouth.*
D. *Limb of corolla much shorter than the tube*.....10. **grandis**
DD. *Limb of corolla nearly as long as the tube.*
E. *Lf. rarely over 1 ft. long: corolla usually less than 1 in. across*.....11. **Saundersii**
EE. *Lf. usually much over 1 ft. long: corolla usually more than 1¼ in. across*.....12. **Wendlandii**

7. **Gálpinii,** Hook. f. Acaulescent: lf. solitary, sessile, ovate-oblong, obtuse, very entire, base subcordate, silky-villous above, fleshy nerves which are strongly red beneath: scapes several, they and the pedicels densely glandular-pubescent: fls. racemose, on stout erect or spreading pedicels, violet; calyx-segms. linear, obtuse; corolla campanulate, tube slightly incurved, lobes 5, equal, spreading-recurved, orbiculate. Transvaal. B.M. 7230. J.H. III. 23:389. G.C. III. 11:139.

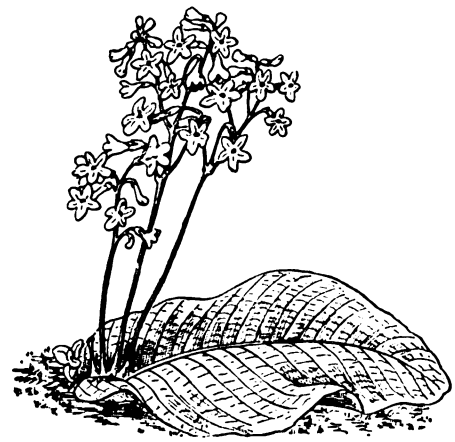
8. **Dúnnii,** Mast. Fig. 3735. Acaulescent, soft glandular-pubescent or tomentose: lf. solitary, very large, 2–3 ft. long, sessile, ovate-oblong, obtuse, margin irregularly lobulate and crenate, bullate between the reticulate veins, midrib thick and villous beneath: scapes very numerous, clustered, produced serially, stout, 1 ft. or more high, bearing many-fld., secund panicles: fls. 1½ in. long, pale brick-color to rose, short-pedicelled, inclined or nodding; calyx-segms. linear-oblong; corolla curved, tubular-funnel-shaped, puberulent, lobes short rotund, ciliolate. S. Afr. B.M. 6903. G.F. 3:609 (adapted in Fig. 3735).—A plant sometimes produces more than 100 fls.

9. **polyánthus,** Hook. Acaulescent: lf. solitary, 5–7 x 3 in., round or elliptic, obscurely crenate, hairy on both surfaces: scapes 1–3, up to a foot or more high, rather stout, 4–10-fld.: calyx hairy, teeth linear; corolla pale blue, about 1¼ in. across, tube linear-cylindric, curved, limb unequal, the 3-lobed lip much longer than the 2 upper segms. S. Afr. B.M. 4850. Gt. 6:206.

3735. Streptocarpus Dunnii. (× about ⅓)

R.H. 1862, p. 250; 1889, p. 398; 1896, p. 12. Var. **grandiflórus,** Hort., is a large-fld. form. H.F. II. 1:128. —Said to be a garden hybrid.

10. **grándis,** N. E. Br. Acaulescent: lf. solitary, radical, 2–3½ ft. long, 1–2¼ ft. broad, ovate, base cordate, crenate, pubescent on both sides; cauline lvs. none or few, small, ovate, sessile: peduncles several,



3736. Streptocarpus Wendlandii. (×⅓)

1½–3½ ft. high, bearing above 2–6 lax racemes, pubescent: fls. in 2's, lavender or light blue outside, white within, marked with 2 broad lilac stripes in the throat; corolla-tube about 1 in. long, bent downward, upper lobes pale blue or lavender. Zululand. B.M. 8042.

11. **Saúndersii,** Hook. Acaulescent: lf. solitary, sessile, flat on the ground, 14 x 12 in., very broadly elliptic, short-hairy on both surfaces, crenate, yellowish green above, purple-rose beneath: scapes 1–5 from the axil, 10–18 in. high, sometimes bearing a small lf. near the base; cyme repeatedly divided, 40–80-fld.: calyx-lobes narrow-oblong, hairy; corolla pale blue with purple blotches in the throat, tube somewhat funnel-shaped, a little curved, limb oblique, 2 lobes much shorter. S. Afr. B.M. 5251. F.S. 17:1802. Gt. 24:826.

12. **Wéndlandii,** Sprenger. Fig. 3736. Acaulescent: lf. solitary, attaining a size of 30 x 24 in., crenate, closely hairy, red-purple beneath: scapes several, 1–2½ ft. high, forked; infl. 6–8 in. long, 30-fld.: calyx-lobes linear, hairy; corolla violet-blue, tube about 1 in. long, slightly curved, limb 1½ in. across, oblique, lobes broad and entire. S. Afr. B.M. 7447 (part of which is copied in Fig. 3736). G.C. III. 22:275. Gn. 45, p. 511; 50, p. 394. J.H. III. 28:223. G. 17:181.—One of the finest species in cult.

Section IV. HYBRIDA.

(For colored pictures of modern hybrid types, see Gn. 29:545; 41:843; 50:1092.)

13. **achimeniflórus,** Hort. Acaulescent: lvs. several, radiating or opposite, rather elliptical, somewhat fleshy, brilliant light green: fl.-st. stiff, most often 1-fld.: fl. as large as a gloxinia, but with the corolla divisions more deeply cleft, and finely dentate, bright lilac tinted with marine blue through pale lilac to pure white, the lower part of the corolla is always striped with deeper color. Possibly a garden hybrid. R.H. 1906, p. 309. Var. **álbus,** Hort., is offered in the trade as a large-fld. white form. Var. **gigantéus,** Hort., is offered as a lavender-blue form. Var. **rósseus,** Hort., is offered as a soft delicate rose form.

14. **Bruántii,** Hort. (*S. Rexii* × *S. polyanthus*). Lvs. very large, not cordate, very velvety, bright green: scapes up to 14 in. high: fls. about double the size of

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those of *S. polyanthus*, about 1½ in. long, blue or bright mauve, throat yellowish white. Garden hybrid.

15. **Dȳeri**, W. Wats. (*S. Wendlandii* × *S. Dunnii*). Acaulescent: lf. solitary, 2 x 1¼ ft., rich olive-green above, vinous purple beneath, soft-hairy: fl.-st. 1–2 ft. high, several from a lf.: fls. numerous, long-tubular, bright red-purple. A garden hybrid.

3737. Streptocarpus kewensis. (×⅓)

16. **kewénsis**, Hort. (*S. Rexii* × *S. Dunnii*). Fig. 3737. Lvs. 2 or 3, large, but not so large as those of *S. Dunnii*, oblong or elongate-ovate, bright green: fl.-sts. numerous, each 6–8-fld., forming a tolerably compact mass: fls. bright mauve-purple, striped with dark brownish purple in their throat; corolla about 2 in. long, 1¼–1½ in. across. Garden hybrid.

17. **Wátsonii**, N. E. Br. (*S. luteus* × *S. Dunnii*). Lf. solitary, similar to but smaller than that of *S. kewensis:* scapes several, bearing 10–16 fls. each: fls. about 1¼ in. long and 1 in. across, bright rose-purple, with a white throat, which is striped with brownish purple. Garden hybrid. G.C. III. 2:215.

The following species are either little known or have not found their way into general cult.: *S. Armitàgei*, Baker & Moore, is closely allied to S. Dunnii, differing in having a corolla much less funnel-shaped and straighter, with less spreading lobes; originally described as solitary-lvd., but 4 lvs. are said to have developed in the cult. plant. S. Afr.—*S. Bánksii*, Lynch (S. Wendlandii × some hybrid), has 2 lvs. about 19 x 13 in. for the lower, the second somewhat smaller: fls. large, purple-blue. Garden hybrid. G.C. III. 56:192.—*S. bifłòrus*, Pucci, is a name appearing in horticultural journals for some unknown plant, which is said to have several blue fls.—*S. bifłòro-polyánthus*, Duch., is a hybrid, the female parent of which is S. polyanthus, the male the above-mentioned S. biflorus: it is said to have 5 ovate-oblong, crenate, rugose lvs.; several scapes with 2–4 pale lilac fls. F.S. 23:2429.—*S. Blȳthìnii*, Lynch (S. Wendlandii × S. cyaneus), has 2–5 lvs., the largest of which is 15 x 9 in. and another is 12 x 7 in., green beneath, in some cases reddish toward the tip, in others with the color here and there: scapes 9–10, each with 5–14 fls., about 14 in. high: fls. about 1½ in. across, lavender or bluish purple; petals marked with dark purple stripes. Garden hybrid. G.C. III. 56:260.—*S. cantabrigiénsis*, Lynch (S. cyaneus × S. Dunnii), has several lvs. which are 7–8 x 3 in.: scapes about 7 in. high, 2–12-fld., conspicuously hairy: calyx-segms. linear-lanceolate; corolla 2 in. long, about 1¼ in. across, tube funnel-shaped, lobes rounded, throat white with 7 deeply colored lines, limb deep rose. Garden hybrid. G.C. III. 59:131.—*S. Gaudìnii*, Hort., is offered in the trade.—*S. Grenìi*, Hort. ex Wilson (S. Saundersii × S. Rexii), is dwarfer and more compact than the former parent, the scapes many-fld.: fls. pale lilac-blue. Garden hybrid. G.C. II. 17:303. Said to be the first hybrid streptocarpus.—*S. Hòlstii*, Engl., resembles S. caulescens; plant about 1½ ft. high, producing a large number of sts., each bearing 6–8 dark violet-blue fls. ¾–1 in. long, spotted with white on the midlobe of the lower lip. German E. Afr. (Section I.) B.M. 8150.—*S. hȳbridus*, Hort., is a name applied to garden hybrids in general.—*S. Kirkii*, Hook. f. Caulescent; st. 4–6 in. high, stout, erect, hairy: lvs. 1–2 in. long, broadly ovate, obtuse, crenate, finely pubescent on both surfaces, base rounded or cordate; petiole ¼–½in. long: scapes axillary, very slender, 3–4 in. high: fls. drooping, opposite; calyx-lobes lanceolate, pubescent; corolla ¾in. long, pale lilac, tube hairy, upcurved, broad and subcampanulate, mouth expanded, lobes short rounded, ciliate. Trop. E. Afr. B.M. 6782. (Section I.) Allied to S. caulescens.—*S. lichtensteinénsis*, Hort. (S. Wendlandii × S. Watsonii), has 2 lvs., 1 prostrate and the other smaller and erect: fls. numerous, lilac-blue. Garden hybrid.—*S. Mahònii*, Hook. f. Acaulescent: lf. solitary, 1 ft. or more long, flat on the ground, sessile, ovate-oblong, crenulate, tip rounded, base cordate: scapes many, crowded, densely pilose: fls. long-pedicelled; calyx-segms. pubescent, linear, corolla violet, tube ½in. long, pubescent, decurved, somewhat inflated above; lobes rotundate. Brit. Cent. Afr. B.M. 7857.—*S. multiflòra*, Laing., is a seedling of S. Rexii, with up to 30 large bluish purple fls., which have darker purple lines in the throat and running up onto the lower lip. Garden hybrid. G.C. III. 18:211; 32:327. I.H. 43, p. 67.—*S. orientàlis*, Craib. Caulescent; st. solitary, erect, simple, 6–16 in. high, leafy: lvs. ovate to elliptic-ovate, apex obtuse, base cuneate, crenate or crenate-serrate, 1–3½ x ¾–2¾ in., both surfaces glandular-pilose; petioles up to 2 in. long: infl. axillary, cymose: calyx-lobes lanceolate or linear-lanceolate, white-glandular-hairy outside; corolla purple outside, paler within, tube over 1 in. long, limb about ½in. across, lobes reflexed-spreading, wide oblong, tip rounded. Siam. B.M. 8526.—*S. Veitchii*, Hort., is offered in the trade.

F. Tracy Hubbard.†

STRÉPTOPUS (Greek, *twisted stalk*, referring to the peduncles). *Liliàceæ*. Twisted Stalk. Perennial herbs, with the aspect of Polygonatum, hardy and adapted to the wild-garden; should be grown in shade or with rich, loose, and moist soil in sunlight.

Stems erect from a short dense, or longer, repent rhizome, simple or slightly branched: lvs. alternate, ovate or lanceolate, membranaceous, sessile or clasping: fls. medium-sized, solitary or paired in the axils, nodding, rose or whitish; perianth campanulate, segms. distinct or connate at base; stamens 6; style 3-cleft; ovary sessile, ovoid, 3-celled: berry subglobose, indehiscent.—About 6 species, Eu., Temp. Asia, and N. Amer. Woodland plants closely related to Disporum which has terminal fls.

A. *Fls. purple or rose.*

rȍseus, Michx. Fig. 3738. Rootstock short, stout: st. 1–2 ft. high: lvs. sessile, only partially clasping, 2–4 in. long: peduncles less than 1 in. long, mostly 1-fld.: fls. about ½in. long: berry red, ½in. thick. May–July. Moist, rich woods in the northern states, S. to Ga.

3738. Streptopus roseus. (×½)

AA. *Fls. greenish white.*

amplexifȍlius, DC. Rootstock short, stout: st. usually taller than *S. roseus:* lvs. clasping, 3–6 in. long: peduncles 1–2 in. long, usually 2-fld.: fls. about ½in. long: berry red. May–July. Moist rich woods, N. U. S. and Canada south to N. C. and New Mex.; also in Eurasia.

F. W. Barclay.

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STREPTOSÒLEN (Greek, *streptos*, twisted, *solen*, tube, with reference to the form of the corolla-tube). *Solanàceæ*. Scabrous-pubescent shrub, suitable for greenhouse culture and for outdoors, as an ornamental, in the extreme S. Lvs. entire, not large, rugose: fls. orange-red, pedicelled, in a terminal corymbose panicle; calyx tubular-campanulate, shortly 5-cleft; corolla-tube elongated, spirally twisted below, widening above, limb spreading, 5-lobed, lobes broad, very obtuse; perfect stamens 4, didynamous; ovary stipitate, 2-celled: caps. somewhat leathery, valves 2-cleft.—One species, Colombia.

Jàmesonii, Miers (*Browàllia Jàmesonii*, Hort., & Benth.?). Fig. 3739. Handsome evergreen scabrous-pubescent shrub, 4–6 ft. high, hardy and much cult. in Calif. as far north as San Francisco. June. G.C. II. 21:797. Gn. 26:6. R H. 1883:36. B. M. 4605. F. S. 5:436. P.M. 16:6. G.M. 39:200. V. 7:298; 9:147.—An old favorite in northern greenhouses. F. TRACY HUBBARD.†

3739. Streptosolen Jamesonii. (×½)

STRICKLÁNDIA (named in honor of Sir C. W. Strickland). *Amaryllidàceæ*. Perianth narrowly funnelform, tube short, segms. oblanceolate, equal; stamens not declinate, filaments united half-way up in a cup, lanceolate above it, without any teeth between; ovary globose, 3-lobed, 3-celled: caps. short, deeply 3-lobed, loculicidally 3-valved; seeds many, small. One species, Andes of Ecuador. *S. eucrosioìdes*, Baker (*Leperìza eucrosioìdes*, Baker. *Phædranàssa eucrosioìdes*, Benth. & Hook. f. *Stenómesson Stricklándi*, Baker). Bulb ovoid, 2 in. diam.; tunics brown, membranaceous: lvs. 2 to a st., produced after the fls., thin, green, oblong, 6–9 in. long: peduncle slender, terete, 1 ft. high: fls. 3–4 in an umbel, horizontal or cernuous; spathe-valves linear; perianth-tube green, lobes red, laxly nerved, not keeled nor tipped with green. Andes of Ecuador. G.C. III. 30:263. Cult. as for Phædranassa.

STROBILÁNTHES (Greek, *cone* and *flower*, referring to the inflorescence). *Acanthàceæ*. Herbs or shrubs, erect, sometimes tall, glabrous, scabrous-pubescent or villous; greenhouse, or out-of-doors in extreme South.

Leaves opposite, in a few species strongly separated, entire or toothed: fls. blue, violet, or white, rarely yellow, solitary at the axils of the opposite bracts, sessile or short-pedicelled, sometimes in dense or interrupted terminal spikes or the peduncles clustered at the axils; calyx deeply 5-cleft or almost 5-parted, segms. linear; corolla-tube slender at the base, widened above; limb spreading, 5-lobed, lobes ovate; perfect stamens 4 or 2: caps. oblong or linear, 2-celled at or near the base.—About 200 species, India, Malaya, China, and Japan, also 1 in Trop. Afr. Adapted to the warmhouse.

Strobilanthes are mostly erect half-shrubby plants cultivated for their flowers and foliage. Only young, well-grown plants are attractive, the older ones becoming weedy and unattractive. Some species are grown as ornamental foliage bedding plants, but they are not so desirable for general use as the coleus, the slightest cool weather changing the color of their leaves to a very undesirable shade. In the greenhouse they make fine decorative foliage plants but require at all times a high temperature and an abundance of moisture and much syringing. Under unfavorable conditions they lose their leaves and become unsightly.

anisophýllus, T. Anders. (*Goldfùssia anisophýlla*, Nees). Branches somewhat zigzag: lvs. broadly lanceolate, acuminate, serrulate, opposite, but one of each pair much smaller than the other: fls. purplish and white; corolla funnel-shaped, very broad at the mouth, with a somewhat irregular 5-lobed limb. India. B.M. 3404. B.R. 955 (as *Ruellia persicifolia*). R.B. 29:36.—Similar to *S. isophyllus* in habit and use.

callòsus, Nees. Shrub, 6–8 ft. high: lvs. elliptic-lanceolate, acuminate, puberulous, narrowed into a long, slender petiole which is winged to the middle: fls. in short, oblong spikes, large, pale violet-blue; corolla-tube very short, dilated into a subcampanulate throat and expanding into a limb 2 in. across; lobes orbicular, undulate. B.M. 7538.—A native of W. India, where it forms a shrub 6–8 ft. high; said to flower in its third year.

Dyerìànus, Mast. An erect, branching, soft-wooded stove shrub: st. hirsute: lvs. opposite, 6–8 in. long, elliptic-lanceolate, serrulate, cordate at base, sessile, variegated with iridescent tints of blue and lilac, rose-purple beneath: fls. in erect spikes, 1½ in. long, pale violet; calyx unequally 5-lobed, lobes linear, obtuse; corolla-tube curved, ventricose, limb of 5 short, broad, revolute lobes. Burma. B.M. 7574. R.B. 20:133. J.H. III. 26:359. A.G. 17:297. V. 19:67. G.M. 46:149.—Used for bedding.

gossýpinus, T. Anders. Shrubby, covered with dense yellowish wool: lvs. 4 x 2 in., ovate, acute, base broad-rhomboid, subcoriaceous, entire, wool of upper surface deciduous: spikes 1–3 in. long, linear-oblong, woolly, compound, becoming paniculate: fls. violet; calyx-segms. narrowly lanceolate; corolla nearly straight. India. B.M. 7790. G.M. 56:958.

isophýllus, T. Anders. (*Goldfùssia isophýlla*, Nees). A low, much-branched, bushy shrub, 2–3 ft. high, swollen at the joints: lvs. short-petioled, opposite, narrowly lanceolate, distantly serrulate or entire: peduncles axillary, shorter than the lvs., bearing several fls.: corolla 1 in. long, funnel-shaped, blue and white; limb 5-lobed; lobes emarginate. India. B.M. 4363. B. 5:244.—Used either for bedding or for pots. Blooms profusely either in winter or summer, according to treatment.

Micholítzii, Ridley. Subshrub, 3–4 ft. high: st. 4-angled, dilated at the nodes: lvs. lanceolate or ovate-lanceolate, 6 x 2 in., one of the pair much larger than the other, acuminate at both ends: racemes axillary, very numerous, cone-like, ½–¾ in. long; bracts rounded, white, tipped with green: fls. white, projecting slightly from the cone. Sumatra.

S. auriculàtus, Nees. Shrub, 2–6 ft. high, glabrous, except the more or less hairy tips of the branches: lvs., one sometimes 10 x 2¼ in., the other 3 x 1½ in., ovate, serrulate: spikes terminal, solitary: fls. pale purple. India. H.U. 6, p. 196.—*S. glomeràtus*, T. Anders. Shrub, with branches often horisontal and hairy upward: lvs. ovate and acute, complanate (flattened), serrate, hairy or villous above: fls. purple, about 2 in. long. India. B.M. 3881 (as Goldfussia glomerata).—*S. Wàllichii*, Nees. Weak subalpine shrub with angled branches: lvs. elliptic, acuminate: fls. blue, in pairs or solitary. Himalaya. B.M. 5119 (as Goldfussia Thomsoni).

HEINRICH HASSELBRING.
F. TRACY HUBBARD.†

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STROMÁNTHE (Greek, *couch* and *flower;* said to allude to the form of inflorescence). *Marantàceæ*. Perennial herbs grown in the warmhouse for the foliage.

Stems leafy, erect, from a thick horizontal rhizome, somewhat branched, the base covered by the long lf.-sheaths: lvs. short-petioled: infl. rather lax, terminal on a long peduncle, more or less compound, rarely narrow, almost raceme-like, frequently all colored blood-red; bracts and bractlets spathe-like, colored; sepals 3, free, oval-oblong; petals 3, slightly narrower than the sepals; ovary 1-celled, 1-ovuled: fr. subglobose.—About 12 species, S. Amer. (Schumann, in Engler's Das Pflanzenreich, hft. 11.—IV. 48). Closely allied to Calathea, Maranta, Phrynium and Thalia. It agrees with Maranta and Thalia in having a 1-loculed caps., and thereby differs from Calathea and Phrynium, which have 3 locules. From Maranta it differs in having a very short perianth-tube and the segms. not standing opposite each other. From Thalia it differs, as does Maranta, in having 2 side staminodia rather than 1. For cult., see remarks under *Calathea*.

Porteàna, Griseb. (*Maránta Porteàna*, Koern.). Two to 4 ft. high, with maranta-like lvs., the blades long-elliptic or ovate-lanceolate, varying from acuminate to almost obtuse, purple beneath, bright green above with transverse stripes or bars of silvery white: fls. solitary or twin on the rachis, blood-red, the infl. simple or compound. Brazil. Lowe 26.

sanguínea, Sonder (*Thàlia sanguínea*, Lem.). Lf.-blades about 1 ft. long, oblong-acuminate, purple beneath and green above: scape 12–20 in. tall, red toward the top, bearing a panicle of bright red and red-bracted fls. Probably Brazilian. B.M. 4646 (as Phrynium). F.S. 8:785. J.F. 3:268; 4:401.—An old garden plant. Thrives in an intermediate house and attains a height of 5 ft. when planted in a border. Var. **spectábilis,** Eichler (*S. spectábilis*, Lem. *Maránta spectábilis*, Koern.). Lvs. particolored with green beneath. L. H. B.

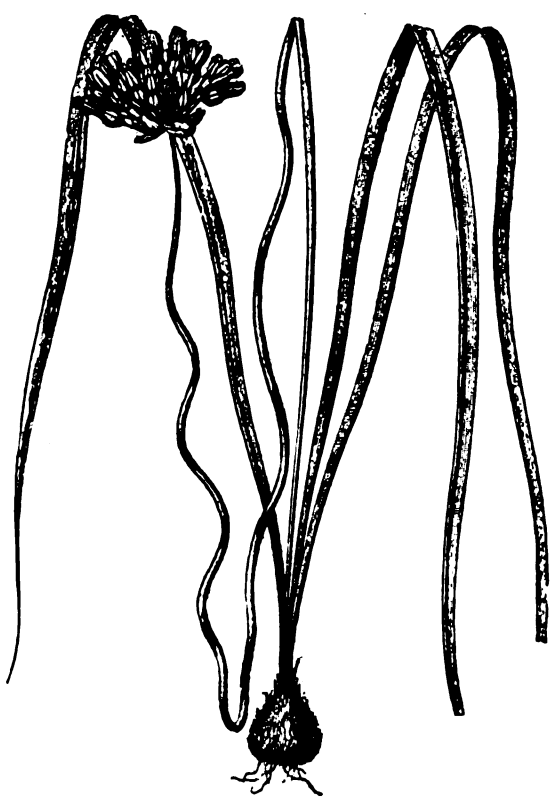
STRONGYLÒDON (Greek, *round* and *tooth;* the lobes of the calyx are rounded). *Leguminòsæ*. Glabrous twining shrubs or subshrubs: lvs. pinnately 3-foliate, stipelled; stipules small: fls. red, showy, fasciculately racemose on elongated, axillary peduncles; calyx-teeth broad, obtuse; standard ovate-oblong, acute, recurved, finally reflexed, 2-appendaged inside above the claw; wings shorter than the standard and adherent to the keel which is beaked, strongly incurved, equaling the standard and connate with the petals; stamens free from the standard; ovary stipitate, 1- or few-ovuled: legume stipitate, obliquely ovate-oblong, 2-valved.—About 20 species, Madagascar, Ceylon, to N. Austral. and the Pacific islands. May be planted far S.

pseudolùcidus, Craib. Climbing shrub: lvs. 3-foliate, nearly 5 in. long; lfts. more or less ovate, 3½x2–2¼ in.: racemes axillary, up to 3 in. long: fls. bright red, about 1 in. long. Madagascar, Ceylon, N. Austral. B.M. 8494.

STROPHÁNTHUS (Greek, *twisted cord* and *flower*, alluding to the corolla-segms.). Incl. *Roupéllia*. *Apocynàceæ*. Shrubs, often scandent, glabrous or more or less hairy, with persistent or deciduous foliage, suitable for the warmhouse: lvs. opposite, rarely ternate: infl. terminal, often at the ends of short branches, corymbose, many- or few-fld. or reduced to solitary fls.: fls. mostly showy; sepals 5, imbricate, sometimes foliaceous; corolla funnelform or campanulate, tube cylindrical, long or short, mouth with paired appendages alternating with the lobes which are 5, acuminate and produced into very long filiform tails; disk none: mericarps 2, follicular, oblong or fusiform, divaricate.—About 40 species, Trop. and S. Afr. and Trop. Asia.

S. dichótomus, DC. Erect shrub with stout branches: lvs. elliptic-oblong or obovate, 3–5½ x 2–3 in., obtuse, acute or apiculate, rather coriaceous: cymes much shorter than the lvs., dichotomous, few-fld.: sepals subulate from an ovate base; corolla-tube and throat ¼–1 in. long, whitish tails 5–7 in. long, purple: follicles very large, 8 x 2 in., divergent. India, Malaya, and Java. H.U. 2, p. 225. —*S. grandiflòrus*, Stapf (S. Petersianus var. grandiflorus, N. E. Br.). Dense shrub, 5–6 ft. high, with long, slender, reddish brown branches: lvs. ovate to elliptic-oblong, shortly acuminate, 2–3 x ¾–1 in., membranous: cymes terminal on leafy branches, usually reduced to a single fl.: sepals oblong to lanceolate-oblong, erect; corolla wide, purplish without, milk-white or creamy within, the lobes ovate, produced to filiform tails about 6 in. long. Trop. and S. Afr. B.M. 7390.—*S. grátus*, Franch. (Roupellia grata, Wall. & Hook.). Small glabrous tree or shrub: lvs. oblong, short-acuminate, base obtuse or subacute, leathery: cymes terminal, sessile, few- to 12-fld.: fls. white or tinged with pink, large; sepals broad, oblong or obovate; corolla-tube 1½ in. long, lobes broad, obovate, ¾–1 in. long; ovary glabrous: follicles obtusely acuminate. Trop. Afr. B.M. 4466. G.C. III. 28:151. J.F. 1:16.—*S. Ledièrii*, Stein. Shrub, with softly and sparingly pubescent branches, brown when young: lvs. obovate, abruptly cuspidate, cuneate at the base: cymes sessile, terminal, 3–7-fld.: sepals linear from an elliptic base, acute; corolla-tube pale yellow, the lobes deep yellow, ovate, 6–8 in. long, including the tails: follicles slender, brown, mottled with yellow, coriaceous. Trop. Afr. Gt. 36:1241.—*S. Preùssii*, Engl. & Pax. Rambling or climbing shrub, up to 12 ft. high: branches glabrous, brown or red-brown: lvs. elliptic or oblong to obovate or ovate, abruptly acuminate, 2–5 x 1½–2 in.: cymes terminal, corymbose, many-fld.: sepals linear-oblong or linear; corolla cream-colored to orange with purple spots and streaks in the throat and purple tails, the lobes ovate, suddenly constricted and produced into tails 1 ft. long. Trop. Afr. B.M. 8250.—*S. speciòsus*, Reber (S. capensis, A. DC.). Glabrous, rambling shrub: branches trailing on other shrubs, sometimes running high up, olive-green: lvs. in whorls of 3–4, rarely the uppermost opposite, oblong-lanceolate to lanceolate, acute, rarely acuminate, 1½–3½ x ½–1 in., leathery: cymes terminal or pseudo-axillary, corymbiform, few- to 12-fld.: sepals lanceolate to linear, sometimes recurved; corolla cream-colored to yellow or orange spotted with red, the lobes attenuate from a somewhat broader base into linear spreading tails about 1–1½ in. long: follicles very slender, lanceolate, about 6 in. long. S. Afr. B.M. 5713. F. Tracy Hubbard.

STROPHOLÍRION (Greek for *twisted rope* and *lily*, referring to the twining stem). *Liliàceæ*. Herbaceous, with a corned base, used for outdoor planting: lvs. few, radical: scape simple, leafless, often twining several feet fls. rose, numerous in a terminal umbel; perianth urn-shaped, 6-lobed; stamens 3; ovary sessile, ovoid, 3-



3740. Stropholirion californicum. (×⅓)

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celled: caps. included in the persistent calyx, globose.—One species, Calif. Very like Brodiæa, and sometimes referred to that genus, but differing in always having 3 stamens and a perianth which is contracted at the throat and saccate at the base. **S. californicum,** Torr. (*Brodiæa volubilis,* Baker). Fig. 3740 (adapted from Pacific R. R. Rep.). In many ways it resembles *Brevoortia Ida-Maia,* except that the scape is climbing to a height of 3–4 ft., and bearing an umbel of delicate rosy pink fls. The scape twines readily about any stick or bush that stands near it. Lvs. 1 ft. or more long, keeled, ½in. or less broad: corm about 1 in. diam. Cent. Calif. B.M. 6123. G.C. III. 20:687. Cult. as for *Brevoortia Ida-Maia.*

CARL PURDY.

STRUTHIÓPTERIS: *Matteuccia.*

STRŸCHNOS (an old Greek name used by Theophrastus for some plants belonging to Solanaceæ). *Loganiàceæ.* Scandent shrubs with short tendrils, or trees, of economic importance; some of the species have been introduced into the southern United States.

Leaves opposite, in scandent species some axils bear short clavate tendrils, the adjacent lf. being often suppressed: cymes terminal or lateral; bracts small: fls. white to yellowish; calyx 5–4-lobed; corolla 5–4-cleft, tube short or long or hardly any, lobes valvate; stamens 5; ovary 2-celled (or 1-celled above): berry globose or oblong.—About 220 species, tropics of both hemispheres.

Nux-vómica, Linn. Tree attaining a height of 40 ft.: lvs. ovate, 5-nerved, glabrous, 3½ x 2 in.: cymes terminal, short-peduncled, 1–2 in. diam.; pedicels hardly any: fls. numerous; corolla-lobes glabrous: berry 1½ in. diam., globose, many-seeded. India.—The seeds yield the drugs, nux-vomica and strychnine, and the bark is somewhat used as a tonic.

potatòrum, Linn. f. Tree attaining a height of 40 ft.: lvs. elliptic, 2½ x 1 in., 3-nerved, subsessile, glabrous or nearly so: cymes axillary, nearly sessile, 1 in. diam.: berry ½–⅔in. diam. India and Ceylon.—The seeds are known as the clearing-nut as they have the property of clearing muddy water when they are rubbed on the inside of the vessel into which it is put.

spinòsa, Lam. Low tree: branchlets slender, armed with pungent spines from the nodes: lvs. obovate or suborbicular, 5-nerved from near the base, glabrous, subcoriaceous: cymes short, dense, terminal, very compound: fls. greenish; calyx-tube very short, segms. linear; corolla-tube short, campanulate, the lobes usually 5, ovate: fr. the size and color of an orange, the shell leathery, the pulp abundant and edible; seeds large. Trop. and S. Afr., Madagascar, and Seychelles.—A promising fr. intro. into the S. U. S.

S. Schumanniàna, Gilg (S. Schumanni, Hort.). Tree, 12–22 ft. high with axillary recurved spines: lvs. decussate, elliptical, gray-pilose on both surfaces: cymes terminal on the gray branches, many-fld.: calyx gray-hirsute, lobes linear; corolla-lobes deltoid-ovoid: fr. edible. Trop. Afr. Reported as intro. into S. Calif. but not successful.—*S. Vólkensii,* Gilg. Tree, 30–40 ft. high: branchlets armed at the nodes with curved pungent spines: lvs. oblong or oblong-ovate, glabrous: cymes lax, many-fld., from the tip of the branches; sepals ovate; corolla-lobes ovate: fr. shaped like an orange, edible. Trop. Afr. Reported as intro. into S. Calif. but not successful.

F. TRACY HUBBARD.

STRYPHNODÉNDRON (Greek, *astringent* and *tree;* the bark has a puckery taste). *Leguminòsæ.* Unarmed trees, usually small, with thick branches, grown in the greenhouse and also outdoors in the extreme S.: lvs. twice pinnate, lfts. small, many-paired, frequently rather broad: fls. small, hermaphrodite or somewhat polygamous, borne in short-peduncled, axillary spikes, 5-merous, sessile; calyx campanulate; petals connate to the middle, finally free; stamens 10, free; ovary short-stipitate, many-ovuled: legume linear, compressed, thick.—Nine species in Trop. Amer.

guianénse, Benth. Branchlets subterete, they and the petioles rusty-tomentellous: pinnæ 6–12 pairs; lfts. with 8–10 pairs of divisions, oblique, oval-oblong, 4–5 lines long, shiny above, reddish beneath: corolla smooth, about 3 times as long as the calyx: pod straight or slightly incurved. Guiana and intro. into Fla.

S. floribúndum, Benth. (Acacia pulcherrima, Willd.). Spineless: pinnæ 13 pairs; lfts. many pairs, oblong-linear, obtuse, pubescent beneath; petiole pubescent and with 2 convex glands at base: spikes twin, axillary, filiform: fls. 5-parted, pilose. Brazil.

STUÁRTIA: *Stewartia.*

STYLÍDIUM (*stylos,* a column, referring to the body formed by the union of the stamens and style). *Candolleàceæ* or *Stylidiàceæ.* Herbaceous or somewhat woody perennials of many perplexing species mostly in Australia, seldom grown under glass or in the open in mild climates.

Confusion has arisen in the name of this group, and recent authorities adopt the name Candollea, but Candollea is itself confused. In 1805, La Billardière founded the genus Candollea for the plants which a few months earlier were named Stylidium, Swartz, by Willdenow (Sp. Pl. iv. 146). As the first application of the name Candollea was thus invalidated, La Billardière, in 1806, used Candollea for a genus belonging to Dilleniaceæ; this is the group described on page 653, Vol. II, now included in Hibbertia by Gilg in Engler & Prantl's Pflanzenfamilien, although kept separate by Bentham in Flora Australiensis and by Bentham & Hooker in Genera Plantarum. Although the name Stylidium, Swartz, is antedated by Stylidium, Loureiro, founded in 1790 on a plant of the Cornaceæ, Swartz's name stands, since Loureiro's Stylidium belongs as a synonym to the earlier genus Alangium (see page 243, Vol. I). According to the International Rules, as well as on the principle of fifty years of accepted usage, it is correct to retain Candollea for the Dilleniaceous plants (page 653) and to use Stylidium for the genus we are now considering, as is done by Bentham & Hooker. Schönland, however, in Engler & Prantl, and, earlier, F. von Mueller, revive the Candollea of 1805 and make Stylidium a synonym, and in this case the Candollea of 1806 would become Eeldea of Durand if it is retained as a genus distinct from Hibbertia. According to the Philadelphia or American Code, however, the existence of earlier homonyms, no matter whether valid names or synonyms, prevents the use of Stylidium, Swartz, and of Candollea of 1806, and Forsteropsis would apparently be the name to be used for the Stylidium of Swartz, while Eeldea would replace Candollea. The latest monographer, Mildbraed, in Engler's Pflanzenreich, hft. 35 (iv. 278. 1908), adopts Stylidium, Swartz. It may be said in passing that the generic name Candollea has also been used for plants distinct from either of the groups we are here considering, but these applications are of later origin.

The stylidiums are of very minor importance horticulturally and scarcely appear in the American trade, although *S. adnatum* has been listed in southern California. The species are difficult of determination in Australia; Mildbraed describes 103. Most of the species "form a rosette or spreading tuft of radical leaves from the midst of which springs the scape. Sometimes the following year the new leaves and scape are close to the old ones, forming a dense, tufted stock, the bases of the leaves sometimes assuming a bulbous appearance; in others, one or two short stems are formed above the old tuft, each crowned by a new rosette and scape, and sometimes several successive tufts of leaves, separated by short stems or branches, may be observed." The plants are more or less lobelia-like, with pink, purplish, yellow, or white fls. in racemes, panicles, or cymes; corolla irregular, five-lobed of which four lobes ascend in pairs and the other (the lip) much smaller and deflexed or sometimes nearly as large as

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the others and curved upward; calyx five-lobed, more or less two-lipped; stamens two, united with the style: fruit a capsule, two-valved from the top downward: leaves all radical, or scattered in whorl-like tufts, as described above.

S. adnàtum, R. Br. (Candollea adnata, Muell.), has mostly very narrow or linear lvs. scattered along the st., the upper ones crowded in a terminal tuft: fls. pink, nearly sessile in compound racemes or spike-like panicles: sts. 12 in. or less long.—*S. Brunonianum*, Benth. (Candollea Brunoniana, Muell.). Tufted or rarely proliferous, the radical lvs. linear to oblanceolate: scapes 12–18 in. high, with whorls of narrow lvs., and bearing many small pink fls., the corolla-throat appendaged, B.R. 28:15. H.U. 4:72.—*S. ciliàtum*, Lindl. (S. saxifragoides, Lindl. Candollea ciliata, Muell.).—*S. piliferum*.—*S. dichòtomum*, DC. (S. mucronifolium, Hook. Candollea dichotoma, Muell.). Low, the scapes 2–4 in. high and glandular-pubescent: lvs. narrowly linear, acute, scattered between tufts at base and top: fls. yellow in a glandular-hairy compound raceme or panicle. B.M. 4538. F.S. 6:606 (as S. Hookeri). J.F. 1:59.—*S. graminifòlium*, Swarts (S. Armeria, Labill. Candollea graminifolia, Muell.). Tufted or somewhat proliferous, the scapes 6–18 in. high: lvs. rather rigid, linear, sometimes denticulate: fls. pink, nearly sessile in a raceme or interrupted spike. B.R. 90. B.M. 1918. J.F. 3:286.—*S. pilíferum*, R. Br. Tufted, lvs. linear and hair-pointed, the plant with yellow glandular hairs: scape 6–12 in. high, bearing a raceme or panicle of yellow or whitish or pinkish fls., the corolla-throat not appendaged. B.M. 3883 (as S. ciliatum); 4529 (as S. saxifragoides). J.F. 1:34.

L. H. B.

STYLÒMA (name refers "to the large indurated styles"). *Palmàceæ*. A genus very recently proposed by O. F. Cook for the Pacific island palms heretofore referred to Pritchardia (Journ. Wash. Acad. Sci., 1915, p. 241). *Pritchardia pacifica* under this disposition becomes *Styloma pacifica*, Cook; and the other species on page 2810, Vol. V, become *S. Gaudichaudii*, *S. Martii*, *S. pericularum*, and *S. Thurstonii*, Cook. He keeps *Pritchardia Wrightii* distinct under Colpothrinax.

3741. Stylophorum diphyllum. (×¼)

STYLÓPHORUM (Greek, *style* and *bearing*, in reference to the persistent style). *Papaveràceæ*. Hardy, perennial herbs, with stout rootstocks and yellow sap: lvs. radical, pinnatifid or none; cauline few, lobed or cut: fls. yellow or red; peduncles elongated, solitary or somewhat fascicled; buds nodding; sepals 2; petals 4; stamens many; ovary 2–4-placentæ: caps. frequently stipitate, ovoid, oblong or linear, dehiscent from the apex to the base.—Three species, according to Fedde, one from N. Amer., the other two from China.

diphýllum, Nutt. (*Papàver Stylóphorum*, Hort.). Celandine Poppy. Fig. 3741. A hardy perennial about 1 ft. high, forming large clumps: st. with 2 lvs. at the summit: lvs. light green, pinnately parted: fls. yellow, 2 in. across, in clusters of 3–5. May, June. Moist shade, W. Pa. to Wis. and Ark. B.B. 2:102. J.H. III. 34:475. Gn. 65, p. 283.—An attractive plant of easy cult. in any rich, rather loose, moist soil in either shade or open, but preferably in partial shade. It is easy to transplant.

F. W. Barclay.

STYLOPHÝLLUM (Greek, *style* or *column* and *leaves*). *Crassulàceæ*. A genus separated from Cotyledon and composed mostly of new species: basal lvs. linear, elongated, base sometimes broad clasping: calyx 5-lobed, the lobes ovate, equal and small; corolla campanulate, not angled, white, red, or yellowish, the lobes broad, thin, and spreading, united below into a tube: carpels 5, united below, generally strongly spreading as in Sedum. —Twelve species all from Calif. **S. Orcuttii**, Rose. Rather stout and very glaucous, woody at base: lvs. linear: calyx-lobes obtusish; corolla-tube shorter than the calyx, the lobes rather broad and somewhat keeled, rose-colored, not at all tinged with yellow. S. Calif. and adjacent islands.—This plant was distributed as *Cotyledon attenuata*, which is probably a different species.

STŸRAX (ancient Greek name of *Styrax officinalis*). *Styracàceæ*. Storax. Ornamental woody plants chiefly grown for their handsome flowers.

Deciduous or evergreen trees or shrubs more or less stellate-pubescent: lvs. short-stalked, exstipulate, more or less covered, like the infl., with stellate hairs: fls. white; calyx campanulate, obscurely 5-toothed or truncate; petals 5, connate only at the base; stamens 10, inserted at the base of the corolla and usually somewhat connate below; ovary superior, often united at the base with the calyx, 3-loculed at the base, 1-loculed at the apex; style slender: fr. a drupe, mostly subglobose, fleshy or oftener dry with dehiscent pericarp, 1–2-seeded, with large, subglobose seeds.—About 100 species in the tropical, subtropical, and warmer temperate regions of Amer., Asia, and Eu. There is a monograph by Miss J. Perkins in Engler, Pflanzenreich (IV. 241), Styracaceæ, pp. 17–88 (1907). *S. Benzoin* yields the benzoin, a balsamic exudation of the wounded tree; storax, a similar gum-resin, was formerly obtained from *S. officinalis*, but the storax of today is a product of Liquidambar.

The storaxes are handsome shrubs of graceful, usually loose and spreading habit with numerous white and mostly fragrant, often pendulous, flowers in racemes or few-flowered clusters, followed by rather insignificant subglobose drupaceous fruits. *S. japonica* and *S. Obassia* are the hardiest and stand the winter in sheltered positions as far north as Massachusetts. *S. americana* is somewhat tenderer; *S. grandifolia* is hardy about Philadelphia and *S. Wilsonii* is probably of the same hardiness; *S. officinalis* is hardy only South. They are well adapted for borders of shrubberies or as single specimens on the lawn, and thrive best in a light, porous soil. Propagation is by seeds which are usually profusely produced in cultivation, sown soon after ripening, and by layers sometimes grafted on *Halesia carolina*; *S. japonica* and *S. americana* may also be grown from cuttings, but usually only a small percentage will root.

A. *Fls. in many-fld. racemes: lvs. 2–10 in. long.*

B. *Young branchlets, petioles, and racemes grayish-tomentose.*

grandifòlia, Ait. Shrub, 4–12 ft. high: lvs. oval to obovate, shortly acuminate, usually narrowed toward the base, denticulate or almost entire, glabrous above, grayish-tomentose or -pubescent beneath, 2½–6 in. long: fls. fragrant, in loose racemes 3–6 in. long or sometimes in clusters; corolla fully ⅓in. long, with spreading, oblong petals: fr. subglobose, about ⅓in. across.

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May. S. Va. to Fla. L.B.C. 11:1016 (poor). B.B. (ed. 2) 2:723.

BB. *Young branchlets, petioles, and racemes soon glabrous.*

Obássia, Sieb. & Zucc. Shrub or small tree, 30 ft. high: young branchlets and petioles covered with a quickly disappearing floccose rusty tomentum: lvs. orbicular to broadly obovate or oval, abruptly acuminate, usually rounded at the base, remotely dentate above the middle and sometimes tricuspidate at the apex, glabrous above, pubescent beneath, 6–10 in. long: fls. fragrant, in racemes 5–7 in. long; rachis glabrous; pedicels and calyx finely tomentose; corolla ¾in. long, with slightly spreading obovate-oblong petals: fr. ¾in. long, ovoid, pointed. May. Japan. S.Z. 1:46. B.M. 7039. G.C. III. 4:131 (not correct in regard to habit). A.F. 12:30. M.D.G. 1898:16. S.I.F. 1:80. G. 36:531.

AA. *Fls. in few-fld. clusters or short racemes: lvs. ½–3 in. long.*

B. *Lvs. ½–1 in. long, serrate or denticulate, tomentose beneath.*

Wilsonii, Rehd. Small compact shrub, to 6 ft.: lvs. rhombic-ovate or oval, obtuse or acutish, sparingly toothed or denticulate, sparingly pubescent above, white-tomentose beneath, ½–1 in. long: fls. short-stalked in 3–5-fld. clusters, ⅓–½in. long; calyx stellate-pubescent; corolla-lobes oblong: fr. globose-ovoid, ⅓in. long, finely velvety. May, June. W. China. B.M. 8444. G.M. 56:369. G. 36:161. R.H. 1914, p. 33.—Handsome little shrub, begins to bloom when about two years old and less than a foot high.

BB. *Lvs. 1–3 in. long.*

C. *Petals 5–8: lvs. pubescent beneath, entire, usually obtuse.*

officinàlis, Linn. Shrub or small tree, to 20 ft.: lvs. broadly oval or ovate, obtuse or acutish, entire, stellate-pubescent, at least when young, 1–2½ in. long: fls. in few-fld. tomentose clusters; pedicels about as long as calyx; corolla ¾in. long, with 5–7 oblanceolate petals; stamens 10–16, with the filaments pubescent and connate at the base. April–June. Eu., Asia Minor. L.B.C. 10:928. Var. **californica,** Rehd. (*S. californica*, Torr.). Shrub, 5–8 ft.: corolla usually 1 in. long, sometimes with 8 petals; stamens connate nearly one-third. Calif.

CC. *Petals 5: lvs. almost glabrous, acute.*

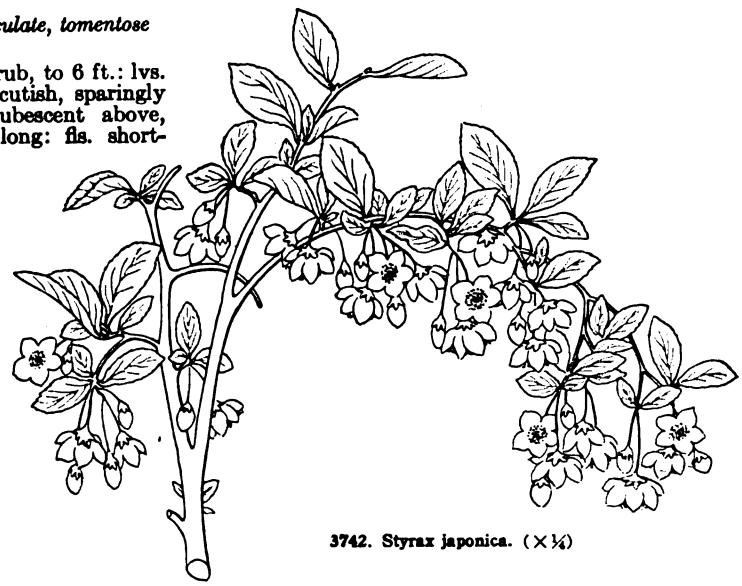
D. *Pedicels about as long as calyx, puberulous.*

americàna, Lam. (*S. glàbrum*, Cav. *S. lævigàtum*, Ait.). Shrub, 4–8 ft. high: lvs. oval to oblong, acute at both ends or acuminate, entire or serrulate, bright green and almost glabrous, 1–3 in. long: fls. nodding, in few-fld. clusters; pedicels about as long as calyx or little longer, puberulous; corolla about ½in. long, almost glabrous, with spreading or reflexed, lanceolate-oblong petals; calyx-teeth minute, acute. April–June. Va. to Fla., west to Ark. and La. B.M. 921. L.B.C. 10:960. B.R. 952 (as *Halesia parviflora*). Var. **pulverulénta,** Perkins (*S. pulverulénta*, Michx.). Lvs. stellate-pubescent, at least when young: fls. on tomentose pedicels. S. Va. to Fla. and Texas. B.B. (ed. 2) 2:723.

DD. *Pedicels ¾–1 in. long, glabrous.*

japónica, Sieb. & Zucc. Fig. 3742. Shrub or small tree, becoming 30 ft. high, with slender spreading branches: young branchlets and lvs. with stellate pubescence, which soon disappears: lvs. broadly elliptic to elliptic-lanceolate, acute at both ends, often acuminate, crenately serrulate, glabrous, 1–3 in. long: fls. pendulous, in 3–6-fld. glabrous racemes; corolla about ½in. long, with slightly spreading, elliptic, tomentulose petals; calyx usually with short and broad, obtuse teeth. June, July. Japan, China. S.Z. 1:23. Gt. 17:583. B.M. 5950 (as *S. serrulatum*). M.D.G. 1899:229, 230. R.H. 1888, p. 320. S.I.F. 1:80. G.W. 3, p. 207. Gn. 76, p. 588. Gn.W. 12:705. G. 32:485; 36:533. G.M. 48:347; 53:143.—The hardiest species and exceedingly handsome in bloom with its profusion of gracefully drooping white fls.

S. Bénzoin, Dry. Small tree, allied to S. japonica: lvs. stellate-tomentose beneath, also pedicels and calyx. Malay Archipelago.—*S. dasyántha*, Perkins. Shrub or small tree, to 25 ft.: lvs. obovate to oblong, acuminate, serrulate, sparingly stellate-pilose, 2½–4 in. long: fls. nearly ½in. long, in many-fld. racemes or panicles. Cent. China. Var. *cinerascens*, Rehd. Lvs. stellate-tomentose beneath.—*S. Hemsleyàna*, Diels. Shrub or tree, to 30 ft.: lvs. broadly ovate, acuminate, serrate, pubescent on the veins beneath, 3–6 in. long: fls. ¾–1 in., in long racemes, sometimes panicled. Cent. and W. China. Gn. 79, p. 205. B.M. 8339.—*S. platanifòlia*, Engelm. Allied to S. californica. Almost glabrous: lvs. undulate or irregularly sinuately lobed. Texas.—*S. serrulàta*, Roxbg. Shrub or tree, 40 ft. high, allied to S. americana: lvs. usually elliptic-oblong, acuminate, distinctly serrulate: fls. short-pedicelled, in 5–10-fld. short racemes; calyx and pedicels tomentose. E. India.—*S. Shiraiàna*, Makino. Small tree: lvs. rhombic to orbicular, coarsely toothed, nearly glabrous, 1½–3 in. long: fls. nearly 1 in. long, in short racemes. Japan.—*S. Veitchiòrum*, Hemsl. & Wilson. Tree, to 30 ft.: lvs. lance-ovate to oblong-ovate, acuminate, denticulate, glabrous, 3–4½ in. long: fls. over ½in. long, in many-fld. racemes or panicles: bears the large galls found on S. Benzoin and other species. Cent. China.



3742. Styrax japonica. (×¼)

ALFRED REHDER.

SUCCÌSA (succise, præmorse; cut off at the lower end, referring to the root). *Dipsàceæ*. Three or 4 herbs, by some authorities incl. in Scabiosa, of the Medit. region to Trop. Afr., marked by the soft or herbaceous scales or palea (involucels) subtending the florets in the head, and by other technical characters. To this genus or group belongs the "teufelsabbiss" of the Germans. The plants are little known in cult., but *S. austràlis*, Mert., is listed abroad among outdoor perennials. Nearly or quite glabrous: lvs. ovate-elongate and acuminate, entire, the lower ones somewhat auriculate: heads ovate, with lilac-violet or ochroleucous fls.; scales of involucre in 2 series. *S. praténsis*, Moench. (*Scabiòsa Succìsa*, Linn.), may be cult.: root præmorse (as if cut off): radical lvs. ovate-lanceolate, acuminate and entire, the cauline ones connate: scales of involucre in 2 or 3 series.

SUCCULENTS: *Planting*, page 2672.

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SUGAR-APPLE: *Annona squamosa.* **S.-Cane:** *Saccharum.*

SUKSDÓRFIA (W. N. Suksdorf, botanist of Washington state). *Saxifragàceæ.* One species as recently delimited, a slender perennial, *S. violàcea*, Gray, growing on wet cliffs and rocks, Mont. to Ore. and Wash.: glandular-pubescent, the rootstock bearing bulblets: fls. small, pink, in few-fld. panicles on leafy axial shoots: st. 1 ft. or less high: lvs. reniform, 5–7-round-lobed, the lower ones petioled and the upper ones on the st. sessile: sepals, petals, and stamens 5, the anthers almost sessile.

SULLIVÁNTIA (William S. Sullivant, American bryologist). *Saxifragàceæ.* Slender perennial herbs, useful in wild-gardens and for colonizing, but scarcely in cult. Four species are now recognized, all natives in the U. S., mostly local, allied to Saxifraga: rootstock horizontal, short: fls. perfect, white or whitish, regular, small, in a panicle on a nearly leafless scape-like st.: lvs. mostly basal, reniform to orbicular, shallowly lobed and coarsely toothed, long-petioled: sepals 5; petals 5, clawed; stamens 5, the filaments subulate, shorter than the petals; carpels united below the beaks, forming erect follicles, the seeds winged. *S. Sullivantii*, Brit. (*Saxifraga* [?] *Sullivantii*, Torr. & Gray. *Sullivántia ohiònis*, Torr. & Gray). Fl.-st. 6–16 in. high, growing on limestone cliffs in Ohio and Ind. *S. Hòpemanii*, Coult., differing in 3-nerved rather than 1-nerved sepals and much smaller stature, grows from Wis. and Minn. to Colo.

SUMACH: *Rhus.*

SUNDEW: *Drosera.* **S.-drop:** *Primula;* also *Œnothera fruticosa* and allies. **S. Rose:** *Helianthemum.*

SUNFLOWER: *Helianthus.* Since the publication of Volume III some progress has been made in the study and breeding of sunflowers, and a brief account of the principal results follows: The investigations of A. H. Church, of Oxford, have shown that the typical unbranched monocephalous sunflower (*Helianthus annuus*, Linn.), which is not known in the wild state, has come down to us unchanged from ancient times, and existed in cultivation in pre-Columbian America. It was grown at Madrid and described by Dodonæus as early as 1567. (American Naturalist, XLIX (1915), page 609). It is found that "marking factors" exist in rays of annual sunflowers, which give rise to different patterns when the anthocyan colors are introduced. The system of markings in *H. annuus* and varieties is quite different from that in *H. cucumerifolius* (or *H. debilis* var.) and varieties; thus the red varieties of *H. cucumerifolius* produced by Herb, of Naples, have rays reddened at the end, or have a red stripe down the middle of the ray, or may have the whole upper surface of ray deep brownish pink, and the under side entirely clear light sulfur-yellow. (Journal of Heredity, VI (1915), page 542). In a culture of red sunflowers (*H. annuus*, variety) at Boulder, Colorado, a collarette form has been obtained in some numbers, both in the chestnut and wine-red colors. The ray-florets have extra lobes, which are small and directed inward, the structure being like that of the collarette dahlia, though less regular. The type will doubtless be improved in course of time. (Gardeners' Chronicle, November 6, 1915, page 295.) Varieties are now obtained, but have not yet been sufficiently selected and isolated, with two or more rows of rays, in the manner of the star dahlias. It is hoped that some very good forms of the red sunflower will be developed along these lines. A new form of the wine-red sunflower has the bicolor pattern, with the background pale (dilute) orange instead of primrose. This gives, in certain cases, an exceedingly rich and bright color. By crossing the silky-haired *H. argophyllus* with vinous *H. annuus*, and again crossing the resulting plants with vinous *H. annuus*, a very pretty new hybrid has been obtained, the rays very pale yellow, tinted with vinous or with a broad ring of color at the base. It has the *H. argophyllus* foliage.

As early as 1896 (Bulletin Torrey Botanical Club, vol. 23, page 357) hybrids between annual and perennial sunflowers were recorded, but without details. The hybrid *H. annuus* × *H. scaberrimus* (*rigidus*) was listed by Thellung in 1913. In 1913 Leonard Sutton in England used the pollen of *H. rigidus* (*H. scaberrimus*) on the red variety of *H. annuus*, and obtained fertile seed. The F_1 had the characters of the perennial parent, but Sutton reports that an F_2 plant has been obtained with small streaks and splashes of red. In 1914 Mrs. Cockerell used the pollen of the perennial *H. pumilus* on vinous *H. annuus*, and obtained seeds which produced plants in 1915. These resembled the perennial parent, and formed rosettes only during the first season. An attempt to force these into flower in the greenhouse in the winter of 1915–1916 totally failed; but three seeds of the original lot placed in a coldframe early in 1916 produced plants, one of which is a rosette, while the other two have formed no rosette, and have flowered the first season, like an annual. The largest of the first lot of plants from the *H. pumilus* × *H. annuus* cross flowered about the middle of July, 1916, and in its mature form showed a curious combination of characters. The rays, however, were entirely without red, and as is usual with perennials, gave a red color with caustic potash. (Since this was written, one of the hybrids has flowered showing the collarette character, and the lobes forming the collarette are largely red.) This hybrid plant has a curiously close resemblance to the horticultural form known as Daniel Dewar. The broad leaves with well-developed petioles are, however, like those of *H. pumilus* and *H. annuus*, not Daniel Dewar. The strongly serrate margins resemble *H. annuus*. At the present time the hybrids between annual and perennial sunflowers present many problems, and are exceedingly puzzling. It seems probable that results of considerable botanical and horticultural interest will eventually be obtained.

S. Alexander of Michigan has made an elaborate study of the forms of perennial sunflowers growing in his region. He finds that only part of the species are perennial in the strictest sense, the others reproducing by underground branches, having no permanent budding crowns. He also finds that the forms are extremely diverse and has recognized over 600 minor species, differing in a variety of characters. This great diversity of character should afford the basis for many interesting horticultural forms. The nature of these lesser types, from the standpoint of genetics, has not been ascertained. If crossing has taken place, the various combinations arising may have been perpetuated and increased by the system of vegetative reproduction by "earth-branches," which would give us areas covered with plants of the same composition, constituting apparently fixed and constant "species." Alexander finds, however, that the true stationary perennials present a great diversity of forms, though they appear to be far less numerous than are the migrators. T. D. A. Cockerell.

SURINAM CHERRY (Fig. 3743), *Eugenia uniflora* (*E. Michelii*) of the family Myrtaceæ, is a large shrub, sometimes becoming a small tree, but commonly branching close to the ground and forming a broad compact bush 6 to 12 feet high. It is indigenous to Brazil, where it is called pitanga. In Cuba it is cultivated under the name of cerezo de Cayena, or Cayenne cherry; in Florida it is a common garden plant, and is hardy as far north as Putnam County, according to Reasoner. In recent years the fruit has begun to appear in the markets. In California the plant does not seem to fruit very freely, and has never become generally cultivated, though it is sufficiently hardy to be grown in the open ground throughout the southern part of the state.

The branchlets are rather thin and wiry: the leaves

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subsessile, opposite, entire, ovate, subacuminate at the apex and rounded to subcordate at the base, 1 to 2 inches long, glabrous, reddish when young but when mature of a deep glossy green color. When crushed they emit a pungent odor which is rather agreeable; in Brazil they are often gathered and scattered over the floors of the houses, the odor which they give off when trampled upon being appreciated and considered efficacious in driving away flies. The white slightly fragrant flowers are about ½ inch in diameter, solitary in the axils of the leaves on slender peduncles up to 1 inch long; the sepals are four, oblong, concave, ciliate; the petals four, oblong-obovate, cupped, ciliate. The stamens are numerous, erect in a large cluster, the filaments filiform and the anthers oval, laterally dehiscent. The style is slightly longer than the stamens, filiform, the stigma simple; ovary bilocular. See page 1162.

The fruits are produced in great abundance during the early spring in south Florida, with frequently a second crop later in the summer; they are subglobose, about 1

3743. Surinam cherry. (×¾)

inch in diameter or somewhat less, prominently eight-ribbed longitudinally, deep crimson in color when fully ripe, each containing one large spherical seed or two hemispherical ones. The flesh is soft and melting, very juicy, of the same color as the thin skin and of an aromatic, subacid flavor. The fruit is a great favorite in parts of Brazil, where it is commonly eaten out of hand or made into jellies, preserves, and sherbets.

The plant is of very simple culture. It is usually propagated by seeds, which will germinate upon the ground beneath the bush if the fruits are allowed to fall. They can be sown in flats of light sandy loam, and covered to the depth of about an inch. Germination usually takes place within a few weeks. When a foot high, the plants may be set out in the open ground, where they require very little attention. They succeed remarkably well on the shallow sandy soils of southeast Florida, but in their native home are found upon clay or clay loam. Their behavior in California indicates that they are reasonably drought-resistant. Because of their attractive appearance and close, compact growth they are often used in Brazil for hedges, for which purpose they are excellent. F. W. POPENOE.

SUTHERLÁNDIA (named for James Sutherland). *Leguminòsæ.* Tender canescent shrubs, hardy in the extreme S., otherwise grown in the greenhouse: lvs. unevenly pinnate; lfts. many, very entire, without stipels; stipules small, narrow: fls. showy, scarlet, few in short axillary racemes; calyx-teeth subequal; standard erect, spreading at the top; wings small, oblong; keel erect, incurved, rather acute, exceeding the standard; stamens 1, free from the standard, the others connate in a sheath; ovary stipitate: legume ovoid, membranaceous, much inflated, rather indehiscent.—One species, S. Afr. Prop. by seeds and said to be easily raised from cuttings. The seeds are generally sown in June or July and the plants wintered in the greenhouse, where they should have very moderate watering and as much air and light as possible. Grown for the bloom.

frutéscens, R. Br. Shrub, about 3 ft. high: lvs. with 9–11 pairs of lfts. and an odd one: fls. drooping and in the best variety 1 in. or more long, not pea-shaped: pod sometimes 2¼ x 1¼ in., bladder-like. S. Afr. G.W. 14, p. 383. Var. **commûnis,** Harv., has lfts. glabrous above, elliptical or oblong: ovaries and pods glabrous. B.M. 181 (as *Colutea frutescens*). R.H. 1896, p. 206. Var. **tomentôsa,** Harv. Lfts. shorter and broader, obovate or obcordate, silvery white on both sides: ovaries and pods hispid. Var. **grandiflòra,** Hort. (*S. floribúnda,* Carr., not Vilm.), has large red fls. and does not bloom until the second year. R.H. 1871:610. Var. **álba,** Hort. (*S. floribúnda,* Vilm., not Carr.), has white fls. F. TRACY HUBBARD.†

SWAINSÒNA (named for Isaac Swainson, an English horticulturist of the latter part of the eighteenth century). Often incorrectly spelled *Swainsonia.* *Leguminòsæ.* Glabrous or subappressed-pilose herbs or subshrubs, adapted to greenhouse culture or out-of-doors in the extreme South.

Leaves odd-pinnate; lfts. many without stipels; stipules frequently herbaceous, base broad, rarely bristle-like: fls. blue-violet, purple, red, rarely white or yellowish, in axillary, usually peduncled racemes; calyx-teeth subequal or the 2 upper shorter; standard orbicular or reniform, spreading or reflexed; wings oblong, falcate or somewhat twisted; keel broad, incurved, obtuse; stamens 9 and 1; ovary sessile or stipitate, many-ovuled: legume ovoid or oblong, turgid or inflated, coriaceous or membranaceous.—About 30 species, Austral. Differs from Colutea chiefly in smaller stature and the large lateral stigma. By far the most popular kind is *S. galegifolia* var. *albiflora.*

A. *Standard with prominent oblique or longitudinal calli: pod stipitate, thin, inflated.* (*S. Maccullochiana probably has no calli; cf. under* AA.)

B. *Calyx densely white-tomentose.*

Greyàna, Lindl. (*S. grandiflòra,* R. Br.). Perennial or subshrub, 2–3 ft. high: sts. erect or ascending, young shoots and lvs. white-tomentose, becoming glabrous: lfts. 11–21, oblong, obtuse or retuse, ¾–1½ in. long: fls. large, pink, in long, erect, pedunculate racemes; calyx dense white-tomentose, teeth short; standard ¾in. diam., with 2 prominent, erect, plate-like calli, wings shorter, keel incurved, obtuse: pod stipitate, inflated up to 1½–2 in. long. Austral. B.M. 4416. B.R. 32:66. H.F. 3:72.

BB. *Calyx glabrous or nearly so.*

galegifòlia, R. Br. (*Vícia galegifòlia,* Andr. *Colùtea galegifòlia,* Sims. *S. Ósbornii,* Moore). Small gla-

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brous attractive shrub, with long flexuose or half-climbing branches: lfts. 5–10 pairs and an odd terminal one, small, oblong and obtuse or somewhat emarginate: racemes axillary and mostly exceeding the foliage, bearing rather large deep red fls.: pod 1–2 in. long, much inflated, stipitate. Austral. B.M. 792. H.F. II. 4:276. J.F. 3:304. J.H. III. 49.547.—An old-time garden plant, blooming freely in a cool- or intermediate house along with carnations and roses. It thrives well either as a pot-plant or in beds. It is hardy at San Francisco. It is a nearly continuous bloomer. Cuttings taken in late winter bloom in summer; these plants may then be transferred to the house for winter bloom, although maiden plants are to be preferred. By cutting back old plants, new bloom may be secured. Cuttings grow readily. The plant is easy to manage. The original form of swainsona is little known in cult., but the advent of the white form has brought the species to the fore.

Var. **albiflòra,** Lindl. (var. *álba*, Hort. *S. albiflòra*, Don). Fig. 3744. Fls. pure white. B.R. 994. L.B.C. 17:1642. A.F. 8:1173; 10:611; 11:1180. Gng. 5:185.—In N. America this is one of the most popular of florists' white fls. for use in winter decorations. It has been called the "winter sweet pea" because of the shape of the fls., but it has no fragrance. The delicate bright green foliage affords an excellent contrast with the pure white fls. This variety is often grown at the end of a rose- or carnation-house, or trained on a trellis. It likes abundant sunlight, rich soil, and liquid manure. When allowed too much root-room, the plants become very large and are slow to bloom, wherefore a large pot or tub is preferable to the border.

Var. **violàcea,** Hort., has rose-violet fls., and is somewhat dwarf. *S. coronillæfòlia*, Salisb., probably represents this form or something very like it. B.M. 1725. *S. coronillæfolia* is an older name than *S. galegifolia*, and if the two names are considered to represent the same species the former should be used.

Var. **ròsea,** Hort., has pink fls.

AA. *Standard without callosities: pod various.* (*S. Maccullochiana may have calli.*)

B. *Lfts. glabrous above, puberulent beneath.*

Maccullochiàna, F. Muell. Shrub, erect, up to 8 ft. high, pubescent: lvs. pinnately compound, 8–10 pairs of lfts., which are elliptic or obovate, mucronate, rather glabrous above, puberulent beneath; stipules obliquely deltoid: raceme many-fld.: fls. reddish purple; standard ovate-orbicular; wings oblong, rounded, base auriculate; keel slightly curved, obtuse: pod 2 in. long, stipitate. N. W. Austral. B.M. 7995.

BB. *Lfts. more or less pubescent on both surfaces.*

C. *Fls. violet-purple: lfts. 9–15 pairs.*

lessertiæfòlia, DC. (*S. Froèbelii*, Regel). Perennial, 1–1½ ft. high: sts. diffuse or ascending, glabrous except the young shoots and foliage which are more or less gray-appressed-pubescent: lfts. 9–15 or rarely more, oblong, obtuse, mucronate or almost acute, ⅓–⅔, rarely 1 in. long; stipules rather broad: fls. rather small, violet-purple, in short racemes, sometimes reduced to umbels or heads; calyx more or less pubescent with black appressed hairs; standard nearly ½in. broad without callosities, wings shorter, keel very obtuse, almost hood-shaped: pod sessile, inflated, ¾–1 in. long. Austral. Gt. 3:89.

CC. *Fls. lilac-rose: lfts. 6–10 pairs.*

ecallòsa, Sprague. Herb, erect, about 2 ft. high, pubescent: lvs. 3–5 in. long; lfts. 6–10 pairs, elliptic-oblong, obtuse or retuse, sometimes mucronate, ½–¾in. long, pubescent on both surfaces; stipules deltoid at base, apex subulate: racemes axillary, 4–5-fld.: fls. lilac-rose; standard without calli, 7–8 lines diam., much longer than the wings; keel broad, obtuse; ovary silky. W. Austral.

S. álba, Hort., is mentioned in the horticultural journals as a form with snow-white fls.; possibly only a variation of S. galegifolia. G.W. 3, pp. 353, 354; 11, p. 13. Var. *grandiflòra*, Hort., is offered in the trade.—*S. atrococcínea*, Carr. Similar to S. Ferrandii but with larger lvs.: infl. large; peduncle slightly purplish: fls. purplish red, standard broad-spread, 2-lobed, slightly convex, with a white spot at base, keel brilliant red-violet. A horticultural form.—*S. Ferrándii*, Hort. Perennial, 12–20 in. high, much branched: lvs. compound, unevenly so; lfts. numerous, elliptic, apex rounded, glabrous: fls. in axillary racemes; peduncle short and arched; standard broadly expanded; wings much reduced; keel small. Probably of garden origin. Var. *álba*, Hort., has pure white fls. Var. *carmínea*, Hort., has carmine-pink fls.—*S. grandiflòra* var. *álba*, Hort., is offered in the trade, very probably is a form of S. galegifolia.—*S. rósea* var. *grandiflòra*, Hort., is offered in the trade.—*S. spléndens*, Hort., appears in the trade. F. TRACY HUBBARD.†

3744. Swainsona galegifolia var. albiflora. (×⅓)

SWEET ALYSSUM: *Alyssum maritimum.* **S. Bay** of general literature is *Laurus nobilis;* in America, *Magnolia glauca.* **S.-brier:** *Rosa rubiginosa.*

SWEET CICELY, or SWEET-SCENTED CHERVIL (*Myrrhis odorata*, Scop., which see), indigenous to Europe on the banks of streams, is a graceful hardy perennial 3 feet tall, with very large downy grayish green, much-divided leaves, hairy stems and leaf-stalks, small, fragrant white flowers, and large brown seeds of transient vitality. The leaves, which have an aromatic, anise-like, sweetish flavor and odor, characteristic of the whole plant, are still occasionally employed in flavoring soups and salads, though their use as a culinary adjunct, even in Europe, is steadily declining. In American cookery, the plant is almost confined to the unassimilated distinctly foreign population. Though easily propagated by division, best results are obtained from seed sown in the autumn either spontaneously or artificially; the seedlings, which appear in the following spring, are set 2 feet apart each way in

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almost any ordinary garden soil. Spring-sown seed frequently fails to germinate. When once established common care will be sufficient.

M. G. KAINS.

SWEET CLOVER: *Melilotus alba.* **S. Fern:** *Comptonia.* **S. Flag:** *Acorus Calamus.* **S. Gale:** *Myrica Gale.* **S. Gum:** *Liquidambar.*

SWEET HERBS. The term "sweet herbs" has long been applied to the fragrant and aromatic plants used in cookery to add zest to various culinary preparations, principal among which are dressings, soups, stews, and salads. At the commencement of the nineteenth century many were to be found in gardens and kitchens that now have been dropped entirely or have but very limited use. Perhaps no group of garden plants during this time has been marked by so little improvement. Except in parsley, very few distinctly new or valuable varieties have been produced or disseminated. This is mainly due to the prevailing ignorance of their good qualities, to which ignorance may be charged the improper handling, not only by the grower, but by the seller and often by the final purchaser. With the public duly awakened to the uses of herbs, improvements in growing, handling, and in the plants themselves will naturally follow, to the pleasure and profit of all.

In this country the herbs best known and appreciated are parsley, sage, thyme, savory, marjoram, spearmint, dill, fennel, tarragon, balm, and basil, arranged approximately in their order of importance. Since parsley is more extensively used as a garnish than any other garden plant, it is grown upon a larger scale than all other herbs combined. Hence some seedsmen do not rank parsley with sweet herbs. Sage is the universal flavoring for sausage and the seasoning *par excellence* for rich meats such as pork, goose, and duck. It is more widely cultivated than thyme, savory, and marjoram, which have more delicate flavors and are more popular for seasoning mild meats, such as turkey, chicken, and veal. With the exception of spearmint, without which spring lamb is deemed insipid and the famous mint julep a thing of little worth, the remaining herbs mentioned above are scarcely seen outside the large city markets, and even there they have only a very limited sale, being restricted mainly to the foreign population and to such restaurants and hotels as have an epicurean patronage.

In many market-gardens especially near to the large cities, sweet herbs form no small source of profit, since most of them, when properly packed, can be shipped in the green state even a considerable distance, and when the market is over-supplied they can be dried by the grower and sold during the winter. Probably more than one-half the quantities used throughout the country are disposed of in the latter manner.

As a rule, the herbs are grown as annuals and are propagated from seed sown in early spring, though cuttage, layerage, and division of the perennials are in favor for home practice and to a certain extent also in the market-garden. Commercially they are most commonly grown as secondary crops to follow early cabbage, peas, beets, and the like. In the home-garden they are frequently confined to a corner easily accessible to the kitchen, where they remain from year to year. In general, herbs should be planted on good light garden soil of fine texture, kept clean by frequent cultivation, gathered on a dry day after the dew is off, dried in a current of warm, not hot air, rubbed fine and stored in air-tight vessels.

For specific information, see articles on the following: *Anise, Angelica, Balm, Basil, Caraway, Coriander, Dill, Fennel, Hyssopus, Mentha, Origanum* (Marjoram), *Parsley, Sage, Samphire, Savory, Tarragon.* Also book on "Culinary Herbs," M. G. Kains.

M. G. KAINS.

SWEET MARJORAM: *Origanum.*

SWEET PEA. The popular name of *Lathyrus odoratus*, one of the Leguminosæ, grown for its handsome and fragrant flowers. See *Lathyrus* for botanical account; for structure of the flower, see *Legume;* see also *Orobus.*

Because of its range of color, beauty of form, fragrance, and value as cut-flowers, the sweet pea is not only the queen of the large genus to which it belongs, but now ranks first among annual flowers. It has been long cultivated in gardens, and in recent years in America it has risen to a place among the five leading commercial cut-flowers.

The sweet pea is a native of the island of Sicily and was first described by Father Franciscus Cupani, a devout Italian monk and an enthusiastic botanist, in a small work published at Panormi in 1695. Cupani sent seeds in 1699 to Dr. Uvedale at Enfield, England, and to Caspar Commelin at Amsterdam, Holland. The latter published a figure and description of the plant in his "Horti-Medici Amstelodamensis" (1697–1701). From this description it is learned that the flowers had purple standards and sky-blue wings, were fragrant, and that the plants were climbing in habit, as they grew to a height of 6 or 7 feet. A white-flowered variety of the sweet pea appears to have been known in 1718, and in 1737 Burmann called attention to the pink-and-white-flowered form. Although he admitted that his plant differed only in the color of the flowers from that described by Cupani, and which, he says, occurred frequently in gardens, Burmann proceeded to make a new species, *Lathyrus zeylanicus*, because he received the seeds among a collection of plants from Ceylon. Later botanists have not found the sweet pea growing wild in Ceylon, from which the authorities conclude that a mistake was made. This form was named Painted Lady and was grown until about 1900, when it gave way to its improved form, Blanche Ferry.

Sweet pea seeds were offered for sale as early as 1724. The three colors mentioned appear to have been the only cultivated varieties until 1793, when the black and scarlet varieties were catalogued. In 1837 the first striped variety, in 1860 a yellow-flowered and also the Blue Edged varieties, were offered. The latter was white with a distinct blue edge. Later this form was known as Butterfly, and it was the forerunner of the Picotee section. In 1865 Invincible Scarlet won the first certificate awarded a new sweet pea. Crown Princess of Prussia, the first of light pink varieties, was offered in Germany in 1868. Adonis (1882) was the first of the rose-pink varieties. Until 1880 (a period of 185 years) little improvement had been made in the sweet pea, and it had not been given the attention that had been bestowed upon the dahlia, verbena, hollyhock, or the rose. There were nine distinct varieties in 1860, and although many new names appeared during the next twenty years, these mainly represented supposed improved strains of the existing colors. It is very probable that not more than fifteen distinct varieties of sweet peas existed when Henry Eckford, the great specialist, began his remarkable work.

No one can understand the improvement in sweet peas within the last forty years unless one considers the form of the flowers as well as the limited number of colors which then existed. The oldest illustrations of the sweet pea show the wings to be more prominent than the standard, and although there appears to have been some improvement in the size of the standard before 1875, nevertheless the flower was lacking in many respects. The standards of most of the varieties had a tendency to reflex at the edges, and the apical notch was very prominent. Often there were side notches which caused the standard to droop forward. The natural line of improvement, aside from securing better colors or color combinations, was to round out the outline of the standard and to give it a more expanded form and greater substance.

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CIX. Sweet peas of the Spencer or Waved type.

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Eckford, after long experience and signal success as a breeder of florists' flowers, began his work on the sweet pea about 1876. Beginning with a few varieties, he patiently crossed and selected for several years before he began to secure results. His first notable variety, Bronze Prince, was awarded a first-class certificate by the Royal Horticultural Society in 1882. Soon he began to secure new colors and sent out the deep bronze-blue Indigo King (1885), Orange Prince (1886) and the dark maroon Boreatton (1887). These were followed each year by new colors and improved forms of the flowers. The hooded varieties appeared and gave a new interest to sweet pea improvement. Although many of the hooded varieties that were introduced had flowers in which the standards were hooded so much as to appear triangular in outline, nevertheless many were very beautiful. The perfection of this form was reached in the variety Dorothy Eckford (1903). The increased size of many of Eckford's varieties led to the name Grandiflora sweet peas, but this name is now used to designate all varieties which do not have flowers of the waved or "Spencer" form.

At the time of the great bicentenary conference on the sweet pea held in London in 1900, Eckford had introduced 115 out of the 264 varieties catalogued up to that time. Even in America the Eckford varieties constituted at least 60 per cent of all lists of selected varieties; and in 1916 of the Grandiflora varieties remaining in the trade, as shown by the catalogue of the leading American dealer, more than one-half originated in Eckford's garden at Wem, in Shropshire.

Improvement in America.

The real interest in sweet peas in America began soon after the first introduction of the Eckford varieties by Breck and by Henderson in 1886. Added impetus was given by the introduction of Blanche Ferry in 1889, and by Emily Henderson in 1893. As early as 1890 the sweet pea had become a popular flower in this country, and soon local sweet pea shows were held. The demand for seed greatly increased and the competition in the shows was keen enough to bring about a desire for new and better varieties. The growers looked forward with anticipation for Eckford's annual set of novelties. Meanwhile in England there was not yet the keen interest in sweet pea that had taken hold of America. The popularity of the sweet pea in America was Eckford's constant inspiration to better things, but gradually England came more generally to appreciate this flower with the result that since the waved form appeared the sweet pea has surpassed the popularity it attained in America. The demand for seed was satisfied when it was found that California had superior advantages for seed production. When the Eckford novelties were grown in California they sometimes proved to be unfixed, and some of these variations, together with the results of some artificial crossing, gave the growers some new varieties. Many of the best striped, as well as marbled varieties, are of American introduction.

The most striking novelty in sweet peas, the dwarf or cupid race, was found in California in 1893 and was offered to the seed trade under the name Cupid in 1895. The first variety was white-flowered. This was followed by other varieties, and soon all the colors then known in sweet peas were to be found in the dwarf type. The Cupid sweet pea grows only a few inches high, forming a dense mass. The dwarfing is the result of the extreme reduction in the length of the internodes of stems. The flowers were of the open and hooded form, borne upon short stems, and characterized by little or no fragrance. They appear to thrive under more drought and heat than the ordinary type. They have not succeeded very well outside of California, for in a season of normal rainfall in the East the plants are injured by lying on the moist ground. The appearance of the dwarf sweet pea offers perhaps the best example of synchronous variation on record. This remarkable variation appeared in California, Germany, England, and France within the period of two years prior to its announcement here by Burpee.

The Cupids were followed by the bush varieties which were considered to be intermediate in growth. This class did not gain much favor and soon disappeared. The snapdragon varieties, which had the standard reduced in size and in contact with the wings, giving the blossom the general effect of a snapdragon, were offered in 1897 but attracted little attention.

The winter-flowering type is the most important of all those originating in America. This type has been perfected in this country and has tremendously enhanced the financial value of the sweet pea as a cut-flower. No other country can begin to approximate the extent of the industry of sweet pea growing under glass.

Development of the waved varieties. (Fig. 3745.)

At the time of the bicentenary of the sweet pea, it seemed as if the future improvement of the sweet pea would be along the line of an increase in the number of flowers to a spike or the securing of new colors or color combinations in the existing open and hooded forms of the flower. No one seemed to realize that the sweet pea was on the eve of the most remarkable improvement in the form of flower and that along with it would come increased size and a greater average number of flowers to a spike. This was the introduction of the waved or, as it is called in America, the Spencer type, in 1904. The first variety was raised by Silas Cole who named it Countess Spencer in honor of the wife of his employer. The parentage of this variety, although doubted by some, has been given as (Lovely × Triumph, 1898) × Prima Donna, 1899. It was shown at various English shows for three years prior to its introduction. Countess Spencer was such an improvement in size, and the form so distinctly new, that it created a sensation. The very large standard and wings were beautifully frilled and waved. The clear pink color was also especially pleasing. This variety was not entirely fixed when it was sent out and soon numerous sports were offered. Among the first of these were the orange-pink Helen Lewis and the carmine-rose John Ingman. Especial difficulty was experienced when the seed of new waved varieties was grown in California, but from this tendency to sport have been secured many of the finest varieties.

3745. Waved type of sweet pea. (×1)

About the time that the Countess Spencer appeared, W. J. Unwin found a sport in the variety Prima Donna which he named Gladys Unwin. It was also of the waved type of about the same shade of pink as Countess Spencer, but the flowers were not so large. Soon other

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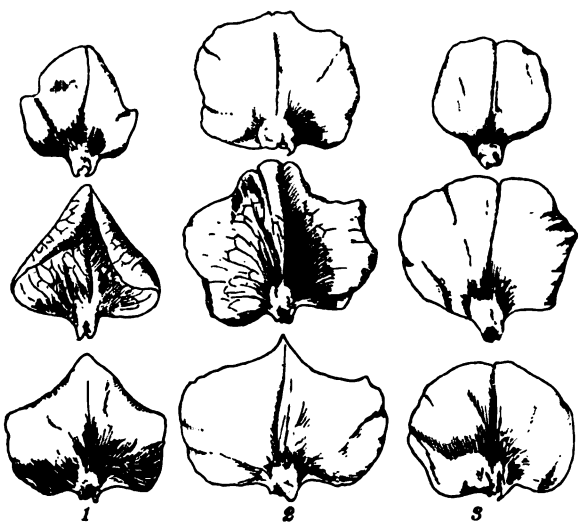
varieties appeared, and for a few years this group vied with the Spencer varieties for popular favor.

The introduction of the waved form aroused great interest and soon large numbers were growing sweet peas for exhibition. Many took up the production of new varieties, and soon new forms were offered in large numbers. In some cases the same sport had been found and given different names. It was seen that hopeless confusion would result if some means were not found to eliminate the synonyms. The English Sweet Pea Society established trial grounds, and when the American Sweet Pea Society was organized in 1909 it established trial grounds in coöperation with the Department of Floriculture of the New York State College of Agriculture at Cornell University, Ithaca, New York. These two national societies hold annual exhibitions, and the American Sweet Pea Society holds exhibitions of winter-flowering varieties at the National Flower Shows held each spring.

Classification.

More than 1,000 varieties of sweet peas have been introduced, but some of these represent strains of existing varieties or were applied to seedlings which did not present any improvement.



3746. Forms of sweet pea flowers: *1*, hooded; *2*, waved; *3*, open. (×1)

The modern sweet pea may be classified as follows: Climbing and dwarf types, the former being subdivided into garden and winter-flowering types. The varieties may be classified as to the form of the flower into open, hooded and waved forms (Fig. 3746).

Garden type	*Winter-flowering type*	*Dwarf type (Cupid)*
Open form	Open form	Open form
Hooded form	Hooded form	Hooded form
Waved form	Waved form	

The open form may be further separated into notched and rounded standards; the hooded varieties according to the degree of hooding, the most extreme case being the snapdragon varieties; and the waved varieties may be classified according to the degree of waviness as it appeared to be less or greater than Countess Spencer. This latter classification would require that the flowers be taken from plants under uniform conditions of growth. The National Sweet Pea Society of England classifies sweet peas according to form of the flower into grandiflora or waved, and into thirty-seven color sections as follows: Bicolor; Bicolor (Dark); Light Blue; Dark Blue; Blush-Pink; Lilac-Blush; Carmine; Cerise (Pale); Cerise (Dark); Cream, Buff, and Ivory; Cream-Pink (Pale); Cream-Pink (Deep); Crimson; Fancy; Lavender; Lavender (Pale); Lilac; Magenta; Marbled and Watered; Maroon; Maroon-Red; Mauve (Pale); Mauve (Dark); Orange-Pink; Orange-Scarlet; Picotee-edged (Cream Ground); Picotee-edged (White Ground); Pink (Pale); Pink (Deep); Rose; Salmon; Salmon (Pink); Scarlet; Striped and Flaked (Purple and Blue); Striped and Flaked (Chocolate on Gray Ground); Striped and Flaked (Red and Rose); White.

The bright sunshine and summer heat of America tends to destroy some of these fine distinctions of color, and the varieties can be grouped in about twenty-five color sections.

Garden culture.

One of the first essentials in sweet pea culture is the choice of an open sunny location, thus providing plenty of light and air. Plants grown in too much shade are weak and spindling in growth, producing few flowers. Any ordinary garden soil is suitable for sweet peas, provided it is sufficiently drained so that in periods of excessive rains the water will not lie on the surface, causing the plants to become yellow and the roots to decay. A heavy soil usually gives better results than a light one as it holds moisture better.

A preparation of the soil as is usually made for the growing of vegetables will give fairly good results; but extra care in the selection and preparation of the soil will be repaid in larger flowers, longer stems, better colors, and a longer blooming-period.

The sweet pea is a deep-rooting plant, and in order to provide suitable conditions so that the effects of drought are overcome, the preparation must be deep and thorough. Deep preparation not only promotes available fertility, but also increases the area in which moisture and nourishment may be found, and the plant responds by sending feeding-roots in all directions.

The preparation of the soil should be made in autumn by trenching at least 2 feet in depth. Since this is an expensive operation, it is advisable instead to dig a trench 16 inches wide and 2 feet deep for each row of peas. If the subsoil is poor or of unsuitable character, it should be removed and replaced with good soil. If the subsoil is very heavy, coarse stable-manure should be mixed with it. A good dusting of air-slaked lime, applied while working the soil in the autumn, is very beneficial. Many soils that have been cultivated for a long time are acid, so that leguminous plants, such as clover or sweet peas, will not grow, or at least do not thrive. Lime corrects this acid condition and, furthermore, it releases plant-food that would not otherwise be available in soils which are not acid. Clay soils are made more open and porous by the use of lime. Half-decayed stable-manure should be mixed with the top soil. Bone-meal applied at the rate of one-quarter to one-half pound to a lineal yard of trench will prove beneficial. The trenches should be filled more than level full, and left rough. During the winter the soil settles, but if in spring the ridges can yet be seen, it will be found that these dry rapidly and thus favor early planting.

Sweet peas for the garden are either sown where the plants are to be grown or are sown in pots and transplanted. Sowing in the open ground may be done either in autumn or spring. South of the latitude of New York, sweet peas may be successfully grown from fall sowings. North of this line the practice is not always successful unless they are planted in a well-drained situation in a sandy loam. The general conditions requisite to success are to plant late so that the seed does not germinate and appear above the surface. If any top growth is made, the plants will be killed in sections where the ground freezes. The rows should be slightly ridged up to prevent water standing over the row. After the ground freezes, a mulch of manure is

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applied. Fall-sown sweet peas bloom ten days to two weeks earlier than the spring-sown, and usually produce better flowers.

Sweet peas planted in the spring should be sown early. As soon as the soil is dry enough, the rows should be sown over the trenches prepared in the fall. If the ridges remain, they will dry earlier than level soil. These may be raked level and a drill opened so that the seed may be sown 2 inches deep and 2 inches apart. After the plants have started, but before they begin to stool, they should be thinned so that the plants stand 3 to 4 inches apart. As soon as the tendrils appear, small twigs should be thrust in the ground to support the plants and prevent their injury by the wind.

3747. Sweet peas started in pots, with supports.

Sweet peas may be sown in 3- to 4-inch pots (Fig. 3747). A suitable potting-soil made of well-rotted sod, with a little leaf-mold and sand, is best. Four or five seeds are sown in each pot and covered with an inch of clean sand. The sowing should be made six to eight weeks prior to the usual time sweet peas can be sown. The pots are placed in a cool greenhouse or a well-protected coldframe and given plenty of light and air so as to keep the plants short and sturdy. When the plants begin to produce tendrils, insert some small twigs in the pots to support the plants. The plants are gradually "hardened off" so that they may be set out in the open ground. One great advantage of this system is that the grower is independent, to a certain extent, of weather conditions as he can wait until the soil is in the best possible condition before planting. The pots may be set 12 to 18 inches apart, using care to keep the ball of earth intact and without interfering with the supports. Good twiggy brush will make the best supports for sweet peas, but when not obtainable, wire netting makes an excellent support. The latter is durable and looks neater when not covered with vines.

The soil should be frequently stirred, and in hot weather a mulch of straw or lawn-clippings will serve to conserve moisture. If waterings are given in dry weather, they should be copious. The quality of the flowers may be improved by watering with weak manure water, but other liquid fertilizers are seldom used. The prompt removal of all withered flowers and pods is essential in preserving a long period of bloom.

Sweet peas in greenhouses (Figs. 3748, 3749).

The winter-flowering varieties are the most important type yet developed from the garden form, and this type has attained its greatest perfection in the United States. This range of sweet peas is distinct in habit of growth and early-flowering character. Unlike the garden type which apparently ceases growing for a time when the plants are a few inches high while the side shoots develop, the winter-flowering sweet peas grow rapidly until they attain a height of 2 to 4 feet. Then they begin to flower freely, after which time side branches are developed. Winter-flowering varieties planted in September begin to flower between Thanksgiving and Christmas, while varieties of the garden type planted at the same time do not flower until April or May. A knowledge of these characteristics of the early stage of growth will enable a grower to guard against considerable loss from getting the wrong seed.

Soon after the introduction of Blanche Ferry, florists began to grow that variety in boxes placed across the ends of the greenhouse where the plants were near the glass, or small clumps were grown on carnation benches and trained round the purlin posts. With such methods of culture, and with the varieties then available, the flowers were not received on the market in sufficient quantity to be quoted until March or April.

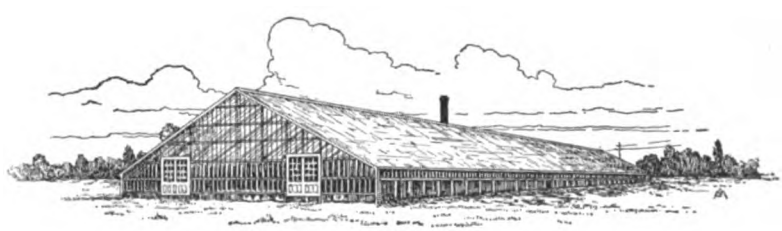
Anton C. Zvolanek, in 1892, found a chance seedling among the variety Lottie Eckford which was much earlier and dwarfer in habit. This was later crossed with Blanche Ferry, and the result of this line of crossing was the variety Christmas Pink, sent out in 1899. Miss Florence E. Denzer, a white variety, was introduced in 1902. Since the latter date many varieties have been sent out. The first varieties had flowers of the open or hooded form, but as soon as the waved sweet peas were introduced, Zvolanek made crosses with the winter-flowering varieties. It was not until 1912 that this class was ready to introduce to the trade, but in 1913 twelve varieties were offered. At present waved varieties of all the colors known among winter-flowering sweet peas are grown, and the older varieties are rapidly disappearing in the competition.

Another group of the early-flowering sweet peas is the Telemly, originated in Algeria in 1900. These varieties are an adaptation of the climate of northern Africa where the varieties of the garden type planted in the latter part of September do not flower until May. An exception to this was Blanche Ferry which flowered about the first of April. An early sport was found flowering in February, and from this have been developed a number of varieties which flower from Christmas until after the garden varieties come into bloom. Recently waved-flowered varieties have been developed by Arkwright, the originator of this strain. This group is better known in Australia or England, and in the latter country these varieties are grown to some extent in winter under glass.

The culture of sweet peas under glass has increased rapidly since 1902, when William Sim began to grow this flower extensively and has developed the modern methods. Today large greenhouses are specially constructed for the purpose of growing this flower, and the amount thus invested represents considerable capital.

Low or dark greenhouses are not suitable for raising sweet peas. Large, wide houses with side walls at least 6 feet high and with good top and side ventilation, are now built for sweet-pea growing. No beds or benches are required. If the soil in the greenhouse is not naturally good, it is removed to a depth of 2 or 3 feet and replaced with better earth. The soil is trenched 2 feet deep or deep trenches are dug in which to place composted soil in preparing to sow sweet peas. The soil should be made sweet by the addition of lime, and enriched by liberal applications of bone-meal. Each year the soil should be deeply prepared and manure worked into it before sowing.

The colors most in demand on the market are pink and white, pink, lavender and white. The reds and orange colors are usually grown in less quantity. The



3748. A sweet pea house at Detroit, Michigan.

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varieties chosen should be those possessing good, clear, well-defined colors. The Grandiflora varieties are more productive, but do not bring so good a price in the larger cities as the waved varieties.

The early crop is sown about August 15, and the later crop during the latter half of September. The seeds are sown in drills where the plants are to stand, except the white-seeded varieties which are sown in sand and transplanted. The latter do not germinate well in soil, as a rule, but when treated in this way a good stand is secured. When the rows run east and west they should be 5 feet apart, and if they run north and south they may be placed as close as 3 feet.

The plants should be thinned to four plants to a lineal foot of row whether grown in single or double drills, and in planting from pots this rule should be observed.

Sweet peas are often grown after chrysanthemums, and for this purpose the plants should be started in 2½-inch pots. Two seeds may be planted in deep rose pots or in paper pots. The soil should be fibrous loam with the addition of fine old manure and sharp sand. The seeds are covered 1 inch deep, and the pots placed in a temperature of 55° to 60° F. for germination, after which the plants must be placed in a lower temperature to prevent them from becoming drawn.

The plants must soon have supports, and the best material to use under glass is string. If the rows are in line with the purlin posts, binder twine can be stretched from post to post on either side of the row thus inclosing the plants. These tiers of string will need to be as close as 6 to 8 inches at the bottom, but later as the vines grow may be as much as a foot apart. When the purlin posts are not in the row, temporary posts of iron pipe or 2- by 2-inch strips may be used. Wire netting is generally condemned by commercial growers, owing to the labor and expense connected with its erection and removal, and also because they think more crooked-stemmed flowers result. The vines supported by string can be easily removed at a minimum expense and the house quickly made ready for another crop.

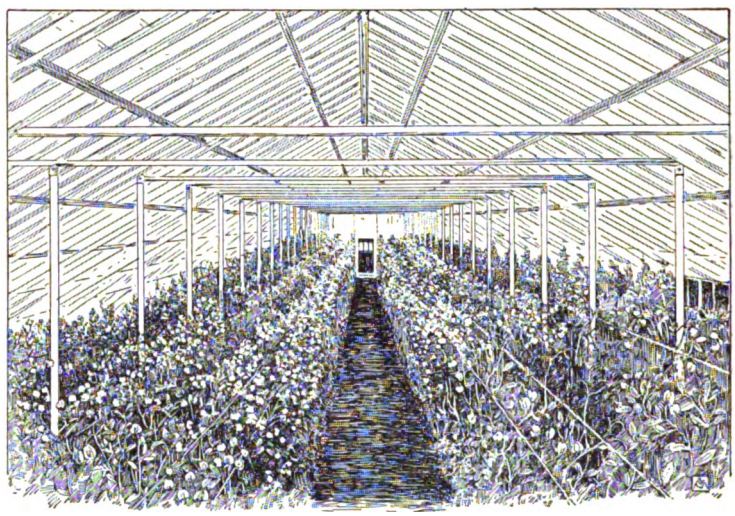
The temperature in the autumn is often too high for sweet peas, and under such conditions the plants often show a tendency to flower when only 2 feet high; but, as a rule, it is usually better to remove all such flowers until the plants gain more strength. As far as possible, the night temperature should be from 40° to 45°, for if a higher temperature is given, the plants flower too soon and before they have made a good root-system. When the plants are from 30 inches to 4 feet high and showing buds, the temperature should be gradually raised to 52°. This is the highest temperature required for the Grandiflora varieties. When in bloom, the temperature should be 60° on cloudy days, and 68° on bright ones. The waved, or orchid-flowering, varieties require the same treatment previous to flowering, after which the night temperature should be 55°, 60° to 65° on cloudy, and 70° to 72° on sunny days.

Picking and packing.

Sweet pea flowers should be picked when the top flower is at least half open, unless the flowers are to be shipped a long distance, when they may be cut in a less fully developed state. The proper time to cut the flowers is in the morning, although this will depend upon the time the shipments can be made. The flowers should be kept two to three hours in water before packing, and this will govern the hour of picking for the florist. The flowers must be packed dry, and if the outdoor flowers must be picked wet, they should be placed while in water in a warm current of air to dry the blooms. The flowers are made into bunches of nineteen to twenty-six spikes, according to quality. These are tied near the base of the stems, which are wrapped with waxed paper. The bunches are packed in shallow boxes with one, or at most two, layers of bunches packed in each box thus preventing the bruising of the flowers. The boxes often employed are 4 by 10 by 12 or 5 by 12 by 24 inches in depth, width, and length. The amount of wrapping on the boxes will depend on the temperature and other conditions at the time of shipment.

Exhibiting.

Exhibitors should keep the flowers off their vines until four or five days before the exhibition, and three days before this event a shade of cheese-cloth should be erected over the orange-, scarlet-, and blue-flowered varieties to prevent the scorching of the blooms. This shading must be removed after the exhibition flowers are cut. The spikes are cut so that all the flowers are fully open when they are judged. The ideal spike has a stem 12 to 18 inches long with four flowers. Twenty spikes loosely arranged so that each may be easily seen, is the proper number for a vase. The stems may be kept in the proper position by placing in the vases some 2-inch pieces of stiff reeds or grass stems. Some gypsophila may be used in the vases if permitted by the rules of the competition. Arrange the vases of a collection of varieties so that colors do not clash and so as best to exhibit the merit of the blooms. The educational value of the exhibit is enhanced if each vase is neatly labeled with the name of the variety.



3749. Interior of sweet pea house.

Insects and other pests.

Snails sometimes destroy sweet pea seedlings in frames or greenhouses, but can be prevented by scattering lime under the pots. The red-spider is sometimes troublesome in the greenhouse and outdoors, and can be controlled by the usual methods. The green aphis or "green-fly" attacks sweet peas under glass, but is easily controlled by regular fumigations of tobacco preparations. In the garden a larger green aphis, the clover aphis, is not infrequently found, but spraying with tobacco extract, nicotine, or kerosene emulsion

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will usually destroy them. Plants that are frequently syringed with cold water are seldom infested with insects.

Fungous pests.

The most prevalent fungous pest affecting sweet peas under glass appears to be *Thielavia basicola*, or root-rot. Infected plants have little or no root-system, due to the fact that new roots are constantly destroyed. The leaflets often turn yellow with white edges, finally dying and falling to the ground. Sometimes one portion of the plant may be dry and dead while the remainder is green, although it does not grow or produce flowers. In fact, it is sometimes a mystery how a diseased plant can continue to live with its very limited root-system. There are some other root-rot organisms, but their action is similar and the method of control is the same for all—the removal of infected soil or sterilizing it.

The powdery mildew attacks greenhouse sweet peas at any stage of growth if the proper temperature is not maintained. The application of sulfur to the heating-pipes will check this disease. Care must be taken not to use the sulfur too strong or the flowers will be injured. Outdoor mildew usually does not appear until late in the season when the plants are failing.

Sweet peas grown in the open garden may be attacked by the root-rots above mentioned or by anthracnose and mosaic diseases, which may be serious. The former attacks the leaves, stems, flowers, and pods, but is most frequently found on the latter which are attacked at any stage of development. The affected parts wilt and die. The disease can be carried over winter upon the seeds. The prompt destruction of infected plants, as well as the burning of all old vines in the fall and the use of clean seed or treating the seed before sowing, will do much to lessen the danger from this disease. The mosaic disease, which may be allied to or identical with the trouble known as streak in England, is a rather baffling disease to the growers. It is distinguished by a yellow mottling of the leaves and stems of the plant. This is often accompanied by a curling of the leaves. The plants become stunted in growth and cease flowering if they have reached the flowering stage. It is a disputed point whether it is a bacterial disease or not, but it seems certain that the trouble is transmissible by the feeding of aphides. No remedy is known except the obvious one of keeping insects in check and destroying affected plants by fire.

The dropping of the young flower-buds either in the open or under glass is usually due to physiological conditions. Low temperature, lack or excess of plant-food, too much nitrogenous fertilizer, lack or excess of water are among the causes of this trouble. A. C. Beal.

Growing sweet pea seed in California.

Up to about the year 1885, most of the sweet pea seed was grown in England, France, and Germany, and imported to this country; at that time the first attempt was made to grow the seed in California. This resulted in almost immediate success, and in 1900 more than 600 acres were devoted to the growing of the crop. Most of the sweet peas grown at this time were of the Grandiflora type and yielded an average of 1,100 pounds to the acre, sometimes in a good year even as much as 2,200 pounds. With the introduction of the Countess Spencer type of sweet pea, about 1904, however, the waved forms supplanted the Grandiflora type, the larger part of the acreage being now devoted to the Spencer type. Approximately 2,500 acres are now planted to the sweet pea.

The original Countess Spencer sweet pea was of a shell-pink color, but it was not fixed and many color sports were produced. At present there are about 150 distinct varieties of the Spencer type under about 460 different names, resulting from different growers finding the same sports, or from varieties which were not improvements on existing varieties of the same colors. The yield of seed to the acre of the Spencer type is much less than from the Grandiflora type, only about 250 pounds to the acre being obtained. This difference in yield is due to the structure of the flowers: in the Grandiflora type the keel is closed, not allowing the pollen to escape so that each variety must pollinate itself, and the varieties can be grown close together and yet remain true to color and type; in the Spencer type, however, the keel is open, allowing the pollen to be blown out, and, as a consequence, about 75 per cent of the flowers do not set seed; also the plants must be set far apart in order to keep them true to color and type.

A cross was made between the Spencer sweet pea and the winter-flowering sweet pea, resulting in the winter orchid-flowering sweet pea. This is a shyer seeder than the Spencer, yielding only about seventy-five pounds to the acre. The flowers resemble the summer Spencer except that the growth is dwarf and the foliage more pointed. If sown in August under glass in the eastern states, they will bloom from November until late in spring. If sown outdoors, they will bloom three to four weeks earlier than the summer type, just before the extreme hot weather.

There are four types of sweet pea now grown in California: the summer Grandiflora, the winter Grandiflora, both of these being grown only on a small scale; the summer Spencer, and the winter orchid-flowering. In addition, the Cupid, which grows 5 to 6 inches high, is occasionally grown, only about 30 acres a season being devoted to it.

The raising of the sweet pea seed is usually on a large scale. Large tracts of land are plowed in autumn about 10 inches deep, either by horse-power or large tractors, before the beginning of the rainy season. The field is then carefully disced and pulverized and left to settle. If the rainy season begins as early as October, the fields should be harrowed again after the rain and the seeds planted. However, if the rains do not come until late, the seed must be sown in the dry soil, although they will not germinate so evenly. The most successful seeding is done between November and January. The seed is sown mostly by four- or two- row horse planters, being planted 30 inches apart and 3 inches apart in the rows, and 2 inches deep. Between each named variety, at least 10 feet must be left to prevent crossing.

After the seed is planted, the field must be kept in good condition by hoeing. After each rain the ground between the rows must be broken up. As soon as the plants are up, a horse cultivator may be used which breaks the crust 2 or 3 inches deep and 3 to 4 inches from the plants; but hand labor must be used to cultivate nearer the plants. This must be done after each heavy rain, sometimes five times being necessary. Irrigation is seldom practised, as 10 inches rainfall is sufficient for a good crop of sweet peas.

By the latter part of March and April the winter or early sweet pea will be in flower, and the summer or late sweet pea begins to bloom in May. Now must begin the process of thinning. No matter how carefully the seeds have been selected, there will be some "rogues" and these must all be removed. The best among these may be tagged and kept for stock seed to grow later on. All novelties and the stock seed for the next year are usually planted and taken care of by hand.

After the thinning has been done, the plants are left to themselves, no supports being given them, until the seed is ripe. These seeds are not evenly ripened and the cutting must be done when the larger part of the seed is ready to be harvested. The cutting is performed by a specially constructed ripper drawn by two horses and cutting two rows at once. As soon as cut,

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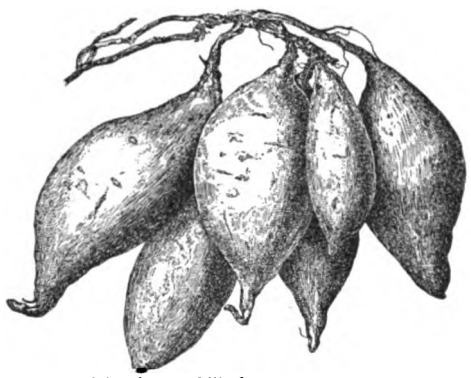
the plants are piled in small heaps and left for several days to dry. They are then put in large piles to cure which takes from three to four weeks. As soon as all the seed is perfectly cured and sufficiently dry, the thrashing begins. This is usually performed by gasoline power, and the clean seed is run directly from the thrasher into the sacks. ANT. C. ZVOLANEK.

SWEET POTATO. The plant *Ipomœa Batatas*, grown for its large edible root-tubers (Fig. 3750). The origin is not definitely known (see page 1662, Vol. III), but it is probably tropical American. It is a widely variable plant in foliage, as shown by the leaf-forms in Fig. 3751. The top is herbaceous, form a running vine. Flowers and fruits are rarely seen.

Neither the acreage, production, nor the money value of the sweet potato crop give an adequate idea of its economic importance. In those parts of the earth's surface where it thrives, it forms an important food staple for the inhabitants, and thus occupies a position not accorded crops which, though of great money worth, do not contribute directly to the food-supply of the territory in which they are grown.

The sweet potato, being native to tropical and subtropical regions, is restricted in its range of cultivation



3750. A good hill of sweet potatoes.

more by climatic than by soil conditions, although its commercial cultivation is confined almost exclusively to sandy or loamy soils. It is, in fact, one of the staples of the southern states which thrives well on lands that have been considerably depleted by cropping with other plants, and one which can be made to produce a profitable return on light sandy soils carrying little humus, provided an adequate supply of plant-food in the form of commercial fertilizer is available. The ability of this plant to thrive and produce under such conditions, together with its great food value, which is considerably higher than that of the Irish potato, has served to advance it to the position of second place among the truck crops grown in the South and to seventh place among the standard agricultural crops of the nation.

Botanically the sweet potato belongs to the Convolvulus or morning-glory family. The edible part is the thickened root. It does not possess eyes or scars as do some other roots and tubers, but it possesses the ability to develop adventitious buds, which character is taken advantage of in reproducing the crop by vegetative means.

Roots to be used for seed purposes, selected at the time of harvest, are usually small, from 1 to 1¼ inches in diameter, of uniform shape, and characteristic of the variety. These roots are cured and stored under conditions most certain to insure an adequate supply of seed material, which, at the northern limit of the cultivation of the crop, is needed for bedding in April to insure a supply of "draws" for planting during the second and third weeks in May.

The seed-supply should not only be selected as above stated but it should be chosen from healthy plants and, in addition, should be carefully examined for disease. All specimens showing the slightest trace of decay or rot of any kind should be discarded.

The soil for the plant-bed, whether it be in the open or a manure- or fire-hotbed, should be free from contamination—preferably sterilized. If such precautions are observed, the first step in the insurance of the crop against loss from rot either in the field or in the storage house has been taken. Young sprouts which grow from the bedded seed roots are known as "draws" or "sets." These are chiefly used for planting in the field, but roots, or pieces of roots, may be and sometimes are used. In the warmer sections where seasons are long, it is a common practice to grow enough early draws or sets to plant an area large enough to give a sufficient quantity of vine cuttings to plant the commercial area. This is a good system as it insures disease-free plants, so far as the root-rots are concerned, for setting the field. An even closer approach to a let-alone system is followed in some sections. Instead of harvesting and storing seed and propagating sets, a portion of last season's crop is allowed to remain unharvested over winter and it is from the volunteer plants of such an area that a supply of vine cuttings for the commercial plantation are secured.

Sweet potatoes are for the most part long-stemmed, creeping, or viny plants. They can be planted in hills but are more often set on parallel ridges thrown up 30 to 36 inches apart. The ridges are often made by throwing two furrows together over a trench in which well-rotted stable-manure has been scattered, or in which commercial fertilizer containing a liberal percentage of potash has been placed. On such ridges the draws are usually planted, either by the use of a hand dibble, tongs, or transplanting machine, 14 to 16 inches apart.

The subsequent culture consists in keeping the area free of weeds with horse-drawn implements as long as the growth of the plants will permit even by the use of a vine-lifter, after which all large weeds are removed by hand.

The signal which summons all hands to the sweet potato harvest is the first frost which causes the leaves to blacken. The home-garden plantation will be harvested with potato forks or with a turning plow after the vines have been cut away with a hoe, but the commercial area will be entered with a special digging-plow with rods in place of a moldboard and two rolling coulters so arranged on a cross-piece fastened to the beam of the digger that they cut the vines on either side of the ridge, thus preventing their interference with the operation of digging. As soon as the roots have been turned out and have dried in the sun, they should be carefully gathered, so as to avoid breaking or bruising, into one-half- or five-eighths-bushel hampers and hauled on spring wagons to the curing and storage house. In placing the roots in the house, care should be exercised to avoid breaking or bruising them. Some growers spread layers of pine straw between each 12- or 15-inch layer of roots placed in the storage house. This practice is less common at the present time since especially designed storage houses have come into general use.

The storage houses in most general use both North and South are frame structures built entirely above ground, although there are a few houses at the North that possess a basement or semi-basement story used for the storage of sweet potatoes. These frame structures are so built that their contents are exposed in the least possible degree to outside changes of temperature. While the buildings are not insulated, they are provided with paper between the studding and sheeting, between the sheeting and the clapboarding, and on the inside under the sheeting. In the more exposed situations, either back plaster or a strip of paper is used between

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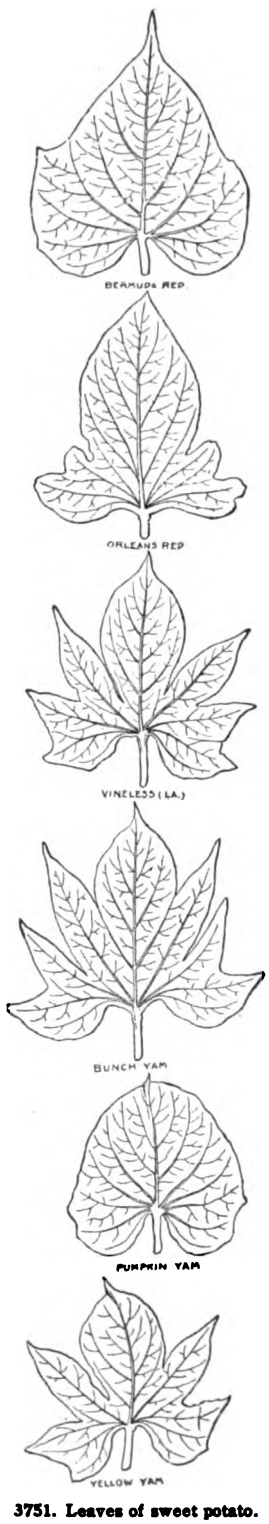
the studding in addition to the construction above noted. The floors as well as the ceilings are made as nearly frost-proof as possible and to add still greater safety the roots are not placed on the main floor of the building itself but upon slat floors raised at least 2 inches off the main floor. Besides adding a factor of safety against frost, these slat floors serve another important function, that of facilitating the distribution of heat throughout the heap of roots during the curing process. The partitions between the bins should also be double-slatted partitions in order to act as ventilators or chimneys so that the ventilation of the material in the storage may be insured as well as more rapid and more uniform curing.

The curing of sweet potatoes at harvest-time is of equal importance with a proper storage room, good ventilation, and the maintenance of a proper storage temperature subsequently. As the sweet potatoes come from the field, they should be placed in the bins in layers distributed evenly over the surface, and during the time the house is being filled and for a period of ten days or more thereafter the temperature of the storage house should be maintained at 85° to 90° F. both night and day. After this drying or curing period, the temperature should be gradually reduced, but at no time during the storage period should it fall below 45° F. The temperature which has proved most satisfactory for holding the roots after the curing period is 50° F. While sweet potatoes can be successfully stored in hampers or crates, most commercial storages depend on the use of bins with slat floors separated by hollow slat partitions. A convenient arrangement is so to construct the storage that each bin holds one carload or other unit quantity, depending on marketing facilities. In no case should sweet potatoes once placed in storage be rehandled or disturbed in any way until the contents of that particular receptacle, be it hamper, crate, or bin, is to be prepared for immediate delivery to the market. Sweet potatoes will not tolerate sorting or handling of any kind while in storage. The successful keeping of sweet potatoes in storage, therefore, depends on care in using disease-free seed or sets, careful handling of the roots from field to storage, a frost-proof storage provided with adequate heat for curing and ventilators for insuring rapid change of air during the curing-period as well as at subsequent periods when atmospheric conditions demand it, and the load of the house so placed, at time of storing, that any given unit may be discharged without disturbing the remainder of the material in storage. At harvest-time, and at all subsequent periods, except in severe weather when there is liability of injury from frost, sweet potatoes can be distributed in double-headed or burlap-covered, ventilated barrels. Such containers are economical, are more convenient to handle than crates or hampers, and form a satisfactory market unit. Bags should never be used. In cold weather when perishable freight or express is liable to frost-injury, strong hampers holding one and one-half bushels or one-half barrel are often used as containers for sweet potatoes. Such packages are prepared for shipment by first lining them with a tough grade of paper, and, after the container has been filled and covered, wrapping it with a similar material. One of the great handicaps to the sweet potato industry at the present time is the highly perishable nature of the crop, making it difficult for those who do not have the best of facilities to market the crop during severe weather except to nearby markets.



3751. Leaves of sweet potato.

There are two important types of sweet potatoes grown in the United States, one with a dry mealy flesh and another with a flesh of a soft, moist, sugary consistency when cooked. The northern markets generally prefer the dry mealy varieties with yellow color, while the soft, moist sorts, either light or deep yellow in color, are preferred by the southern markets. The commercial grower will therefore grow the sort or sorts demanded by the markets in which he expects to dispose of his product. His own likes and dislikes should not be given any weight in choosing market sorts.

Among the dry mealy-fleshed sorts may be mentioned Big Stem Jersey, Yellow Jersey, Early Carolina, and Triumph; characteristic representatives of the other class include such sorts as Nancy Hall, Georgia, Pumpkin Yam, Dooley, and Porto Rico.

L. C. CORBETT.

SWEET SCABIOUS: *Scabiosa.* **Sweet-scented Shrub:** *Calycanthus.* **S.-Sop:** *Annona squamosa.* **S. Sultan:** *Centaurea moschata.* **S. Vernal Grass:** *Anthoxanthum.* **S. William:** *Dianthus barbatus.*

SWÉRTIA (named for Emanuel Swert, a bulb-cultivator of Holland and author of "Florilegium," 1612). Also spelled *Sweertia. Gentianàceæ.* Erect, simple or branched, perennial or annual herbs, some of which are hardy, others adapted to the greenhouse; mostly border or rock-garden plants.

Leaves opposite, or radical in the perennial species, long-petioled, some of the cauline lvs. sometimes alternate: fls. blue, rarely yellow, arranged in racemose panicles or laxly corymbose; calyx 4–5-parted, segms. linear or lanceolate; corolla-tube very short, rotate, glandular-pitted, lobes 4–5, overlapping to the right; stamens 4–5; ovary 1-celled: caps. dehiscing by 2 valves at the sutures.—About 85 species, widely scattered about the world but mainly from S. Asia.

A. *Nectariferous pits destitute of a fringe.*

dilùta, Benth. & Hook. (*Ophèlia dilùta,* Ledeb.). A tender perennial about 1 ft. high: st. winged and angled, branching from near the base: lvs. glabrous, ovate-lanceolate, 3-nerved, rather obtuse, rounded at the base, short-petioled: fls. 4-merous, blue, in a dense, fastigiate umbel; corolla-lobes ovate, rounded at the apex and bearing at the base a single ovate, nectariferous pit destitute of a fringe. E. Asia, Japan.

AA. *Nectariferous pits with a fringe.*

B. *Pits oblong.*

punctàta, Baumg. Perennial: sts. ascending from the base, many-fld.: lvs. several, alternate, elliptic-oblong, acutish; lower attenuate to a broad petiole: fls. erect,

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greenish yellow, dark-spotted; corolla-segms. membranaceous, lanceolate, rather obtuse, pits in 2's, oblong, crested and fringed. S. E. Eu., Caucasus.

BB. *Pits orbicular.*

connàta, Schrenk. Perennial: st. erect, many-fld.: lvs. oblong, acutish, lower attenuate to the petiole; cauline all connate at base: fls. erect, greenish yellow, dark-spotted; corolla punctate, segms. obtuse, apex denticulate; pits distant, very long-ciliate. Siberia.

perénnis, Linn. A hardy perennial ½–1 ft. high: lower lvs. obong-elliptical, long-petioled; st.-lvs. ovate-oblong, obtuse: fls. mostly 5-merous, blue to white, in a thyrse; corolla-lobes elliptical-oblong, acute, bearing at the base 2 orbicular nectariferous pits crested with a fringe. Colo., Utah, and northward; also in the alpine regions of Eu. and in Asia.—*S. perennis* is an alpine bog-plant and should be given a cool deep moist soil.

F. W. Barclay.
F. Tracy Hubbard.†

SWIETÈNIA (named for Gerard van Swieten, 1700–1772). *Meliàceæ.* Trees, sometimes grown in the warm-house, one of them yielding the mahogany of commerce: lvs. even-pinnate, very glabrous; lfts. opposite, petioled, obliquely ovate, long-acuminate: fls. small, in axillary or subterminal panicles; calyx small, 5-cleft; petals 5, spreading; staminal tube urn-shaped, 10-toothed, anthers 10; disk annular; ovary sessile, ovoid, 5-celled: caps. 5-celled, about 3 in. diam.—Three species, Trop. Amer. Intro. into S. U. S.

Mahágoni, Jacq. Mahogany. A large evergreen tree with hard dark red wood of well-known value: lfts. 6–10: fls. greenish yellow. Tropical regions of N. and S. Amer., W. Indies, and S. Fla. G.C. III. 54:437.—According to Mueller, the degree of endurance is not sufficiently ascertained. In Jamaica it hardly reaches an elevation of 2,000 ft. It requires rich soil. It is said that the tree will bloom at small size when grown in pots.

S. Chlorόxylon, Roxbg.=Chloroxylon Swietenia.

F. W. Barclay.

SYÀGRUS: *Cocos.*

SYCAMORE in Europe is *Acer pseudoplatanus;* in America, *Platanus occidentalis,* although this plant should be called plane-tree. The sycamore of the ancients was a kind of fig known as Pharaoh's fig, *Sycomorus antiquorum,* or *Ficus Sycomorus* (for which see pages 1233, 1234, Vol. III).

SYCÓPSIS (Greek, *fig* and *appearance,* alluding to its resemblance to certain figs). *Hamamelidàceæ.* Five species of evergreen shrubs or trees of China and the Himalayas, with generally oblong, entire or denticulate, stipulate lvs. and rather insignificant apetalous monœcious fls. with minute calyx-lobes in heads or short racemes: staminate fls. in heads surrounded by pubescent bracts; stamens 8, with a rudimentary ovary; pistillate fls. with an urceolate calyx inclosing the ovary; styles 2, slender, with decurrent linear stigmas: fr. a dehiscent pubescent caps., with 2 brown lustrous seeds. Only the following species is sometimes cult. for its evergreen foliage; also the staminate fls. with their rather large red anthers are attractive. It stands the winter with some protection or in a sheltered position at the Arnold Arboretum. Prop. is by seeds or by cuttings of nearly mature wood under glass with slight bottom heat. **S. sinénsis,** Oliver. Shrub or small tree, to 20 ft.: lvs. short-petioled, elliptic-ovate to elliptic-lanceolate, acuminate, usually denticulate above the middle, glabrous or sparingly pubescent, 2–4 in. long: pistillate fls. in 6–12-fld. stalked heads; staminate fls. in small heads surrounded by brown pubescent bracts; anthers oblong, red, on slender filaments: caps. densely pubescent. Cent. and W. China. H.I. 20:1931; 29:2834, figs. 1–3.

Alfred Rehder.

SYMBEGÒNIA (name refers to the union of parts of the flower). *Begoniàceæ.* A few small herbs, all natives of New Guinea (Afr.), differing from Begonia in the tubular female fls.; the male fls. have the parts distinct. *S. fúlvo-villòsa,* Warb., for some time the only known member of the genus, appears to be the only species that has appeared in cult., but is apparently not in the trade: erect herb 8 in. or less high, with red-tinged st. and oblique lance-oblong strongly double-serrate green lvs.: female fls. pale yellow, with 5 spreading serrulate lobes and a 3-winged inferior ovary; male fls. of 2 separate sepals, and 12–20 stamens. B.M. 8409.

L. H. B.

SYMBIOSIS is the intimate association of two or more distinct organisms, with benefit to one only, or to both; commensalism, consortism; copartnership. In this association each organism is called a symbiont.

According to the character of the union, several kinds of symbiosis have been recognized: (1) Mutual antagonistic symbiosis (mutual parasitism), when two organisms are foes of each other, as certain bacteria and animals, the latter showing a "natural resistance;" also the syntropism of certain lichens with lichens. (2) Antagonistic symbiosis (true parasitism), when the host is partly or completely killed by the parasite, as the potato and the rot fungus (*Phytophthora infestans*); or galls (hypertrophies) produced on the host, as in the black-knot of plums; and in higher plants, which live at the expense of others, as the mistletoe (green) and the dodder (chlorophylless). (3) Mutual symbiosis, when there is often reciprocal advantage; (*a*) nutricism, when one symbiont nourishes the other without apparently receiving any return, as the mycorrhiza and the roots of forest trees (mycosymbiosis); (*b*) mutualism, when a mutual benefit results from the union of two organisms capable of living separately, as the bacteroid and the roots of the Leguminosæ; (*c*) individualism, when the symbionts are so intimately connected in their growth as to suggest a single individual, as the union of alga and fungus to form a lichen. By some this relationship of alga and fungus in the lichen thallus is regarded as helotism, or slavery, where the alga lives entirely indifferent to the fungus. The views of Bruce Fink, who considers the lichen to be a fungus with an alga associated with it, are widely different from the usually accepted views on the subject. (4) Prototrophy, the wet-nurse relationship, as in the lichen *Lecidea intumescens,* which eventually gets its nourishment by means of a lodger, a different lichen. (5) Contingent symbiosis, when one symbiont lives in the interior of another for shelter, as Nostoc in the tissues of Hepaticæ, Lemna, Cycas, Gunnera; and Anabaena in Azolla. Green plants live symbiotically with animals such as Spongilla, Hydra, and Convoluta. In Hydra, the green alga, known as Chlorella, is found in the endodermic layer and when the colorless eggs of the fresh-water polyp are almost mature a few of the green cells are found migrating into the protoplasm of the egg-cells.

John W. Harshberger.

SYMPHORICÁRPOS (Greek, *symphorein,* to bear together and *karpos,* fruit, referring to the clustered fruits). Sometimes spelled *Symphoricarpus.* Syn., *Symphòria. Caprifoliàceæ.* Snowberry. Ornamental shrubs grown chiefly for their attractive fruits.

Deciduous upright or rarely prostrate shrubs: lvs. opposite, entire, or on vigorous shoots often sinuately dentate or lobed, exstipulate: fls. short-pedicelled, in terminal or axillary clusters or spikes or sometimes solitary; calyx 4–5-toothed; corolla campanulate or tubular, 4–5-lobed; stamens 4–5, included or somewhat exserted, style slender with capitate stigma; ovary with 2 fertile and 2 sterile cells: fr. a 2-seeded berry.—About 15 species in N. Amer., south to Mex. and 1 in W. China; many of the American species are closely related and difficult to distinguish.

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The snowberries are low or medium-sized shrubs with slender upright or decumbent stems, spreading more or less by suckers, with small generally oval or ovate leaves and small clustered, rarely solitary, white or pink flowers followed by attractive usually white, rarely pink, dark red or bluish black berries. The flowers are rather insignificant in most species except in *S. oreophilus*, *S. microphyllus* and allied species which bear larger tubular nodding flowers and are rather attractive when in bloom. The chief ornamental feature is the fruits which are usually white and retained far into the winter; among the handsomest are *S. albus* var. *lævigatus* with heavy clusters of snowy white fruits at the tips of the arching branches, and *S. orbiculatus* with dark red fruits densely clustered along the slender branches and remaining plump and fresh far into the winter, its foliage also remaining unchanged until severe frost sets in. Some species, as *S. albus*, *S. orbiculatus*, and *S. occidentalis*, are quite hardy North, while *S. mollis*, *S. rotundifolius*, and *S. oreophilus* are hardy as far north as Massachusetts; *S. microphyllus* is tender. They are

3752. Symphoricarpos occidentalis. (×½)

excellent plants for borders of shrubberies and for covering the ground under trees, spreading more or less by suckers; they will thrive in almost any soil from heavy clay to dry gravelly banks. Propagation is readily effected by hardwood and by greenwood cuttings, by division, and also by seeds.

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A. *Fr. red: fls. campanulate.*

1. **orbiculàtus,** Moench (*S. vulgàris*, Michx. *S. parviflòrus*, Desf. *S. Symphoricárpos*, MacMillan. *Symphòria conglomeràta*, Pers. *S. glomeràta*, Pursh). INDIAN CURRANT. CORAL BERRY. Shrub, 2–5 ft., with slender upright branches: lvs. oval or ovate, mostly obtuse, usually pubescent beneath, ¾–1½ in. long: fls. in dense and short axillary and terminal clusters or spikes; corolla campanulate, ⅛in. long; stamens and the hairy style included: fr. purplish red, subglobose, ⅛–¼in. across. July: fr. in Oct., Nov., long persistent. N. J. to Ga., Kans., and Texas, west to S. D.; sometimes escaped. Mn. 1, p. 84. Gn. 34, p. 280. G.C. III. 28:413. Var. **variegàtus,** Schneid. (var. *aùreo-reticulàtus*, Zabel). Variegated with yellow.—One of the most desirable species on account of the long-persisting fr. and foliage.

AA. *Fr. white or pinkish.*

B. *Fls. campanulate.*

C. *Style and stamens exserted.*

2. **occidentàlis,** Hook. WOLFBERRY. Fig. 3752. Shrub with upright rather stiff branches, 1–4 ft.: lvs. oval or ovate, entire or undulate-crenate, thickish, grayish green and pubescent beneath, 1–3 in. long: fls. in axillary clusters or spikes ½–1 in. long; corolla campanulate, pubescent inside, pinkish white, ¼in. long: fr. subglobose, white, about ½in. long. June, July; fr. Sept. Ill. and Mich. to Brit. Col. south to Colo. and Kans. G.F. 3:297 (adapted in Fig. 3752). G.C. III. 49:104. Gn. 75, p. 508.—*S. Heÿeri*, Dipp. (*S. occidentàlis* var. *Heÿeri*, Dieck), is very similar and differs chiefly in the thinner lvs. less distinctly veined beneath and more often undulate-dentate and in the somewhat shorter stamens and style; it is possibly a hybrid between this and the following species, found in Colo.

CC. *Style and stamens included.*

3. **álbus,** Blake (*S. racemòsus*, Michx. *Vaccínium álbum*, Linn.). SNOWBERRY. WAXBERRY. Shrub with upright slender branches, 1–3 ft. high: lvs. oval to elliptic-oblong, obtuse, pubescent beneath, on shoots often sinuately lobed, 1–2 in. long: fls. in terminal spikes or axillary clusters; corolla campanulate, pinkish, about ¼in. long: fr. globose or ovoid, snow-white, ¼–½in. long. June–Sept.; fr. Sept.–Oct. Nova Scotia to Alaska south to Pa., Idaho, and Calif. Var. **lævigàtus,** Blake (*S. racemòsus* var. *lævigàtus*, Fern.). Taller, to 6 ft., with glabrous usually larger lvs. and larger clusters of frs. Que. to Wash., south to Va., often escaped. L.B.C. 3:230. B.M. 2211. G.W. 8:115. Gn. 77, p. 527. C.L.A. 15:33. G. 29:169; 35:769 and G.M. 56:763 (as *S. mollis*). Var. **ovàtus,** Rehd. (*S. ovàtus*, Spaeth). A form of the preceding with broadly ovate, bluish green lvs. mostly about 2 in. long and 1¾ in. broad, rounded or nearly truncate at the base.—The snowberry generally cult. as *S. racemosus* is the var. *lævigatus*, while typical *S. albus* is sometimes grown as var. *pauciflorus*, but the true var. *pauciflorus*, Blake, is a low shrub with smaller lvs. with grayish white pubescence beneath and only 1–3 fls. at the end of the branchlets; it is found from Lake Superior to Alberta and south to Colo. and Ore., and is apparently not in cult.

4. **acùtus,** Dipp. (*S. móllis* var. *acùtus*, Gray). Low diffuse or procumbent shrub: branchlets velutinous or puberulous: lvs. elliptic to elliptic-oblong, acute at both ends, soft-pubescent, grayish or whitish beneath, often irregularly dentate, ½–1 in. long: fls. in terminal few-fld. clusters and solitary or in 2's in the axils below; corolla pinkish or white, about ⅛in. long: fr. subglobose, white, ¼–⅓in. long. June, July; fr. Aug., Sept. Wash. to Calif. west to Idaho, Colo., and N. Mex.

BB. *Fls. tubular or funnelform; style and stamens included.*

C. *Anthers reaching about the middle of the corolla-lobes.*

5. **rotundifòlius,** Gray. Upright shrub, to 3 ft.: lvs. orbicular to elliptic, entire or lobed, usually puberulous above, grayish and pubescent beneath, ½–1 in. long: fls. in 2–5-fld. terminal clusters and axillary; corolla pinkish, ¼–⅓in. long, the tube pubescent within: fr. white, subglobose. June, July. Wash. to Calif. and N. Mex.

6. **oreóphilus,** Gray. Upright shrub, to 4 ft., with slender spreading branches: lvs. oval to elliptic, usually acutish, slightly puberulous above, grayish or whitish pubescent beneath, ½–1 in. long: fls. in terminal 2–5-fld. clusters and axillary; corolla pinkish, nearly ½in. long, the tube almost glabrous within: fr. white, ovoid. June, July. Ore. to Calif. and Ariz. I.T. 3:98.

CC. *Anthers as long as corolla-lobes.*

7. **microphýllus,** Kunth (*S. montànus*, Kunth). Upright shrub, to 3 ft.: branchlets glabrous or puberu-

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lous: lvs. ovate, acute, rounded at the base, pubescent and bluish gray beneath, ½–1⅛ in. long: fls. in terminal clusters and axillary; corolla pinkish, ⅛–½in. long, pubescent inside: fr. pink. Aug., Sept. Mex. B.M. 4975.

S. longiflòrus, Gray. Allied to S. oreophilus: lvs. smaller and narrower, acute at both ends: fls. slender, ½in. long; style pubescent. Calif. to Utah and N. Mex.—*S. mòllis*, Gray. Closely allied to S. acutus, but lvs. oval to suborbicular, obtuse. Calif. The plant cult. under this name is usually S. acutus.—*S. sinénsis*, Rehd. Slender glabrous shrub, to 5 ft.: lvs. oval to rhombic-ovate, ½–1 in. long: fls. in terminal peduncled spikes; corolla campanulate, white: fr. bluish black, bloomy. W. China. Has proved hardy at the Arnold Arboretum.—*S. vaccinioides*, Rydb. Allied to S. rotundifolius: lvs. elliptic, acute at both ends, puberulous or glabrescent: fls. small. Wash. to Wyo. and Utah.

ALFRED REHDER.

SYMPHYÁNDRA (Greek, *anthers grown together*). *Campanulàceæ*. Perennial herbs with a thick caudex, most of them hardy.

Leaves broad, usually cordate, dentate, the radical ones long-petioled, the cauline alternate, few or small: fls. usually nodding, rather large, racemose or laxly panicled, white, yellowish or bluish(?); calyx-tube adnate, hemispherical or turbinate, limb deeply 5-lobed or -parted; corolla campanulate, 5-lobed; ovary inferior, 3-celled.—About 8 species from the Caucasus and Asia Minor and one reported from Korea. Its special botanical interest lies in the fact that the anthers are grown together into a tube, which character tends to annul the distinction between the Campanula and Lobelia families. Otherwise the genus is much like Campanula, and used for similar purposes.

A. *Calyx without appendages.*

Hôfmannii, Pant. Much branched, 1–2 ft. high, pilose: branches decumbent: lvs. oblanceolate, acute, doubly dentate: fls. white, pendulous, 1½ in. long, 1 in. or more across, borne in a large leafy panicle; calyx-tube hemispherical, without appendages, segms. large, leafy, cordate; corolla campanulate, hairy inside. Bosnia. B.M. 7298. Gn. 57, p. 303. G.C. III. 4:761. R.H. 1910, p. 285.—Under favorable conditions in England this plant has maintained a succession of bloom from July–Dec. In Amer. the plant is said to be liable to exhaust itself in blooming, thus behaving like a biennial. It has large fleshy roots, needs a dry position, and sows itself. A plant of good habit and well worth cultivating.

AA. *Calyx with appendages.*

armèna, A. DC. Perennial, rather pilose: sts. slender, erect and decumbent, about 6–12 in. high, branched above: lvs. coarsely and rather acutely dentate; lower long-petioled, cordate-ovate; upper minute, subsessile: peduncles filiform, 1-branched or somewhat corymbose, 3–5-fld.; calyx hirsute, segms. spreading triangular, acute, appendages very short, acute; corolla velvety, narrowly campanulate, lobes short. Caucasus.

ossética, A. DC. Perennial, rather glabrous, about 6 in. or less high: sts. leafy, rather stout, incurved-pendulous: lvs. acutely double-dentate; radical rather long-petioled, subcordate, ovate or oblong-acuminate; intermediate lvs. sessile: peduncles filiform, stoutly or rather simply racemose: fls. pale blue; calyx glabrous, segms. very broadly lanceolate, acuminate, appendages acuminate and short; corolla glabrous, tubular-campanulate. Caucasus.

S. péndula, Bieb. Perennial, pilose: sts. fleshy, 6–12 in. high: lvs. crenate-dentate, lower ovate, cordate, long-petioled; intermediate lvs. oblong, acute, cuneate, short-petioled: fls. simply racemose, yellowish white; calyx canescent-tomentose, appendages acuminate; corolla campanulate, whitish-tomentellous. Caucasus. F.W. 1877: 289.—*S. Wánneri*, Heuff. Perennial, hispidulous: sts. 1–3, ascending, 6 in. or more high: lvs. oblong-lanceolate, acutely serrate or somewhat laciniate; radical long-attenuate to the petiole; cauline attenuate to the base, sessile: infl. thyrsoidly branched, branches 1–3-fld.: fls. blue-violet, large, nodding; calyx-tube hemispherical, segms. broadly and elongated-lanceolate, not appendaged; corolla long-campanulate. S. E. Eu. Gn. 65, p. 410.

F. TRACY HUBBARD.

SÝMPHYTUM (Greek, *to grow together*, in reference to the supposed healing virtues). *Boraginàceæ*. COMFREY. Erect often hispid herbs, usually hardy in all but the far North, sometimes grown for the variegated foliage of some species.

Roots sometimes tuberous: lvs. alternate or several radical ones; the cauline sometimes decurrent; the upper sometimes strongly approximate, almost opposite: cymes terminal, usually single or twice bifid or simple unilateral racemes: fls. yellowish, blue, or purplish, pedicelled; calyx 5-cleft or -parted, lobes or segms. linear; corolla broadly tubular, lobes 5, very short; stamens 5; ovary distinctly 4-lobed: nutlets 4, obliquely ovoid, erect, rugose.—About 25 species, Eu., N. Afr., and W. Asia. Monographed by C. Bucknall in Journal of the Linnean Society, vol. 41 (1913). Of easy cult. in any good soil. The shade of overhanging trees is not objectionable. When grown for the beauty of the variegated foliage, the flowering sts. may be removed with advantage. Useful in borders.

A. *St. branched: fls. generally numerous.*

B. *Calyx divided to or below the middle.*

C. *Lvs. decurrent on the st.*

officinàle, Linn. (*S. bohèmicum*, F. W. Schmidt). Perennial, about 3 ft. high: root thick: st. branched, white-pilose: lvs. slightly pilose, basal and lower cauline ovate-lanceolate, upper oblong-lanceolate, all broadly decurrent at base: fls. white, yellowish, purple, or rose, in drooping cymes. Eu., Asia. Var. **argénteum**, Hort., is offered in the trade as growing 2 ft. high, with silver-variegated foliage and drooping blue fls. Var. **aûreum**, Hort., is offered in the trade as a golden variegated form growing 2 ft. high. Var. **coccíneum**, Hort. (*S. coccíneum*, Hort. ex Schlecht.), is offered in the trade as a scarlet-fld. form. Var. **lilácinum**, Hort., is offered in the trade. Var. **purpûreum**, Pers. (*S. officinàle* var. *bohèmicum*, Don), has reddish purple fls. Eu. Var. **variegàtum**, Hort., has lvs. widely margined with creamy white. F.S. 18:1901–1902.

3753. Symphytum asperum. (×⅓)

CC. *Lvs. not decurrent.*

D. *Calyx-segms. obtuse: upper lvs. subpetiolate.*

ásperum, Lepech. (*S. aspérrimum*, Donn). PRICKLY COMFREY. Fig. 3753. Perennial, 2½–5 ft. or even more high: root thick: st. branched, uncinate: lvs. hispid or prickly on both surfaces, ovate or elliptical, acuminate; lower petioled base cordate or rotundate; upper subpetioled, base cuneate: fls. at first rose then blue, smaller than those of *S. officinale*. Russia, Caucasus, Persia. B.M. 929.—Has some forage value. There are horticultural forms with yellow-variegated or -margined lvs. known as *S. aspérrimum aùreo-variegàtum*, and *S. aspérrimum* var. *variegàtum*.

DD. *Calyx-segms. acute: upper lvs. sessile.*

peregrinum, Ledeb. Perennial, about 3½ ft. high: st. erect, tall, branched, prickly, prickles slightly retrorse: lower lvs. long-petioled, elliptic-lanceolate, acuminate, about 10 x 4½ in.; upper lvs. sessile, all

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softly hispid; petioles decurrent: fls. sky-blue; buds pinkish; calyx 5-parted almost to the base, segms. triangular-lanceolate; corolla-tube angled, constricted at the middle, upper part somewhat campanulate, mouth 5-cleft. Caucasus. G.C. III. 50:127.—Closely related to *S. officinale*, may be a hybrid.

BB. *Calyx not divided to the middle.*

caucásicum, Bieb. Perennial, 1–2 ft. high, branched, softly pilose-hirsute, grayish: st. erect: lower lvs.

3754. Skunk cabbage (Symplocarpus fœtidus), as the hoods come up in spring. (×½)

oblong, attenuate to the petiole; upper lvs. narrowly and shortly decurrent: fls. paniculate-corymbose, blue; calyx viscidulus and setulose; corolla tubular-funnelform, lobes shortly and broadly ovate. Caucasus.

AA. *St. simple or nearly so: fls. generally few.*

B. *Lvs. nearly glabrous.*

cordàtum, Willd. Perennial: st. simple, glabrous: lvs. rather glabrous, subrotund-cordate, acuminate, radical long-petioled; cauline short-petioled; uppermost sessile, ovate-lanceolate: fls. yellowish white, in short, recurved racemes; calyx somewhat 5-parted, lobes lanceolate; corolla funnelform-tubular. Hungary.

BB. *Lvs. hispid.*

grandiflòrum, DC. Perennial, about 1 ft. high: st. rather simple, base glabrate, otherwise reflex-spreading, hispid: lower lvs. long-petioled, subcordate-ovate, acute, decurrent along the petiole; uppermost lvs. opposite, oval, decurrent on the st.: fls. yellowish white, in a few-fld. raceme; calyx lobed below the middle, lobes linear; corolla-lobes broad and obtuse. Caucasus. G.W. 7, p. 294.

F. Tracy Hubbard.

SYMPLOCÁRPUS (Greek, referring to the aggregate fruit). *Aràceæ. Spathyèma* is the older name, but the other is retained by the "nomina conservanda" list of the Vienna rules. Skunk Cabbage. A hardy swamp-loving perennial herb which pushes up its hooded spathes in very early spring or even before the first of January in favored situations.

Spadix globose or oblong, entirely covered by fls., the ovaries of which are embedded in the spadix; perianth of 4 hooded sepals; anthers 2-celled; style pyramidal, 4-sided; ovary 1-loculed, with a solitary, suspended, anatropous ovule: berries in large heads, 1-seeded.—Only one species. See Krause, in Engler's Pflanzenreich, hft. 37 (IV. 23 B), 1910.

The spathes are 3 to 6 inches high, usually grow in clumps, and the variation in their coloring is a never-failing delight. They are mottled with purplish brown and greenish yellow, the former color sometimes becoming bright red, the latter ranging from dark green to bright yellow. These spathes are produced several weeks before the leaves appear, and they inclose odd flowers which are described below in detail. Just when the skunk cabbage flowers is a matter of some debate; the stamens are generally out in February or March. The hoods retain their beauty for months. In April or May they decay and the strong-growing leaves soon attain a height of 1 to 3 feet and a breadth of 1 foot or more. All parts of the plant give a strong skunk-like odor, but only when bruised. Skunk cabbage is offered by dealers in hardy plants, as also by collectors. Its hardiness and bravery have been celebrated by outdoor writers from Thoreau to the present day. The question of its pollination has been much discussed. It was long supposed to be pollinated by the action of the carrion flies which are attracted by its odor. However, Trelease has shown that the bees are busy with the pollen while the plant is in flower and that the carrion flies mostly come later.

fœtidus, Linn. (*Spathyèma fœtida*, Nutt.). Skunk Cabbage. Fig. 3754. Lvs. numerous, 1–3 ft. long, 1 ft. wide, ovate, strongly nerved: spathe preceding the lvs., colored as described above: fr. ripe Aug., Sept. Nova Scotia to Minn., south to Fla. and Iowa; also in Asia. B.M. 836 (as *Pothos fœtida*); 3224. V. 23:186. A.G. 14:367.

Wilhelm Miller.

SŸMPLOCOS (Greek, *symplocos*, entwined or connected, the stamens being connate at the base). Including *Hopèa* and *Lòdhra*. *Styracàceæ*. Ornamental woody plants grown chiefly for their attractive flowers and fruits.

Deciduous or evergreen trees or shrubs: lvs. alternate, entire or serrate, exstipulate: fls. perfect or sometimes polygamous, in terminal or axillary racemes or panicles, rarely solitary; calyx 5-lobed, imbricate, corolla 5-lobed or 5-parted, often split almost to the base, rarely consisting of 2 whorls; stamens numerous, rarely few, usually connate at the base, and often more or less adnate to the corolla; style filiform; ovary 2–5-loculed, inferior: fr. a drupe with a long 1–5-seeded stone.—About 285 species, widely distributed through the tropical regions except Afr.; only a few outside the tropics. Monograph by Brand in Engler's Pflanzenreich, hft. 30 (IV. 241), 1907. Several species have medicinal properties; *S. tinctoria* yields a yellow dye.

Of the numerous species only *S. paniculata* which is

3755. Symplocos paniculata. (×½)

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hardy as far north as Massachusetts, is generally cultivated; it is a shrub or small tree with abundant white flowers in small panicles, appearing in spring, and with bright blue berry-like fruits in autumn. It thrives in well-drained soil and sunny position. The half-evergreen *S. tinctoria*, which seems not hardy north of its natural habitat, prefers moist soil and shady situation. The evergreen species are all tender and little known in cultivation. Propagation is by seeds, which usually do not germinate until the second year, and by greenwood cuttings under glass; also by layers.

3756. Synadenium Grantii. (×⅓)

paniculàta, Wall. (*S. cratægoìdes*, Buch.-Ham. *Lòdhra cratægoìdes*, Decne.). Fig. 3755. Deciduous shrub or sometimes tree, attaining 40 ft., with slender, spreading branches, forming an irregular open head: young branches pubescent: lvs. short-petioled, oval or obovate to oblong-obovate, acute or acuminate, sharply serrate, distinctly veined beneath and more or less pubescent at the veins, rarely glabrous, 1½–3 in. long: fls. white, fragrant, ⅛–½in. across, with spreading, oblong-oval petals in panicles 1½–3 in. long: fr. usually 1-seeded, oval, blue, about ⅓in. high. May, June. Himalayas to China and Japan. G.F. 5:89 (adapted in Fig. 3755). M.D.G. 1901:100, 101. S.I.F. 2:68. G. 33:425.

tinctòria, L'Her. SWEET LEAF. HORSE SUGAR. Half-evergreen shrub or small tree, occasionally to 30 ft. tall: lvs. elliptic to oblong-oblanceolate, acute to short-acuminate, undulate or obscurely serrate, lustrous above, pubescent beneath, 2–5 in. long: fls. sessile, ½in. across, yellowish, fragrant, in axillary dense clusters: fr. oblong, crowned with the persistent calyx-lobes, ½in. long, orange-brown. Spring. Del. to Fla. and La. S.S. 6:255, 256.

S. coccínea, Humb. & Bonpl. Evergreen tree: lvs. oblong, acuminate, crenulate, 3–5 in. long: fls. solitary, axillary, pink, 1 in. across, with 10 petals. Spring. Mex. R.H. 1846:281. F.S. 2:133. —*S. japónica*, DC. (S. lucida, Sieb. & Zucc.). Evergreen shrub or small tree, 20 ft. high: lvs. elliptic to oblong, acute, remotely serrate, glabrous, 2–3 in. long: fls. yellowish, in short, few-fld. racemes: fr. oblong, red. Spring. Japan. S.Z. 1:24. S.I.F. 2:66. A shrub which has been distributed by several botanic gardens under the name of S. japonica has proved to be Pyracantha crenulata.— *S. sínica*, Ker. Deciduous shrub, closely allied to S. paniculata: lvs. elliptic, acute, serrate, pubescent on both sides, 1½–2 in. long: fls. white, in short panicles; calyx-teeth acute. May, June. China. B.R. 710.—*S. sumíntia*, Buch.-Ham. Small evergreen tree: lvs. oblong-elliptic, acuminate, cuneate at the base, serrulate, glabrous, 3–5 in. long: fls. white, in short racemes: fr. oblong. Himalayas. Gt. 31:1073.

ALFRED REHDER.

SYNADÈNIUM (Greek name, indicating the united involucral glands). *Euphorbiàceæ*. Thick-branched tropical shrubs, sometimes cult. in collections of succulents, having the generic characters of Euphorbia, except that the glands of the involucre are united so as to form a ring around the lobes.—About 10 species, chiefly in Trop. Afr. Prop. and treated similarly to the succulent euphorbias.

arboréscens, Boiss. A shrub, up to 4 ft. high, the st. unbranched: lvs. obovate-cuneate, obscurely crenulate; midrib keeled and often denticulate: bracts puberulent: involucre yellow. S. Afr. B.M. 7184.

Grántii, Hook. AFRICAN MILK BUSH. Fig. 3756. A shrub 10 ft. or less high, branched: lvs. obovate-spatulate, 3–4 in. long, obtuse; midrib rounded: cymes dichotomous, with tomentose bracts and red involucres. Trop. Afr. B.M. 5633.

J. B. S. NORTON.

SYNÁNDRA (Greek, *together* and *anther*, referring to the connate anthers). *Labiàtæ*. Hardy fibrous-rooted biennial herb, with the habit of Lamium, suitable for border planting: calyx campanulate, inflated; corolla-tube long, much expanded above and at the throat, the upper lip slightly arched, entire, the lower spreading and 3-cleft, with ovate lobes, the middle one broadest and notched; anthers approximate, in pairs under the upper lip, the 2 upper each with 1 fertile and 1 smaller sterile cell, the latter cells cohering together. One species, N. Amer. *S. hispídula*, Brit. (*S. grandiflòra*, Nutt.). Hairy biennial, 1–2 ft. high, lower lvs. long-petioled, broadly ovate, cordate, crenate, thin; the floral lvs. gradually reduced to bracts, each with a single, sessile fl.: corolla 1–1½ in. long, yellowish white. Shady banks of streams, Ohio to Ill., Tenn., and Va.

SYNCÁRPIA (Greek, *together* and *fruit*, referring to the head-like clusters of caps.). *Myrtàceæ*. Trees, one of which is intro. into Calif.: lvs. opposite, ovate, evergreen: fls. gathered in globose heads: peduncles 1-headed, lateral axillary or paniculate at the ends of the branches, rather small, white; calyx-tube adnate at base of ovary, turbinate or campanulate, segms. 4, rarely 5, persistent; petals 4, rarely 5; stamens many, free; ovary inferior, 2–3-celled: caps. adnate to the calyx and inclosed in it.—Two species, Austral.

glomulífera, Niedenzu (*S. laurifòlia*, Ten.). TURPENTINE TREE. Lvs. broadly ovate to elliptic-oblong, obtuse or obtusely acuminate, 2–3 in. long, often appearing as if in whorls of 4: fls. 6–10 in a head, with 2–4 bracts of variable size under the head; calices connate at the base; petals broadly ovate or orbicular, less than 2 lines long; ovary 3-loculed; ovules several to each locule.—According to Von Mueller's Select Extra-tropical Plants, this tree attains a height of 200 ft., with a trunk often 30 ft. in circumference; it is of quick growth and well adapted for a shade tree. The wood is very durable and almost fireproof and is valuable for piles, railway sleepers, and shipbuilding. It takes a high polish and is used for flooring and cabinetwork. Offered in S. Calif.

F. TRACY HUBBARD.†

SYNDÉSMON (Greek, *bound together*, because the plant unites characters of Thalictrum and Anemone). *Ranunculàceæ*. RUE ANEMONE. Dainty perennial herb grown in wild borders for its carpet of beautiful leaves and attractive spring flowers.

Glabrous, from a cluster of tuberous roots: basal lvs. 2–3-ternately compound: involucre similar but sessile, the lfts. being stalked: fls. white or pink, in an umbel; pedicels slender; sepals thin, 5–10, petal-like; petals none; stigma sessile, truncate: achenes terete, deeply grooved.—A monotypic genus of E. N. Amer. Under the International Rules, Anemonella is the tenable name (*Anemonella thalictroides*). Syndesmon was used earlier (1832 as against 1839), but in such a way as not to constitute publication as defined by those Rules, although it is tenable under the American Code. The plant should have been treated under Anemonella in this work.

The plants should be grown in partial shade. The soil should be moist and light or sandy. They should be left undisturbed for years. They will then form a carpet of great beauty. Propagation is by division of roots in spring or fall, but such division greatly weakens them and the plants for propagation should be taken from the edges of the beds.

thalictroìdes, Hoffmg. (*Anemòne thalictroìdes*, Linn. *Thalictrum anemonoìdes*, Michx. *Anemonélla thalictroìdes*, Spach). Fig. 3757. Plant 3–6 in. high: lvs. much like those of thalictrum: fls. resembling those of *Ane-*

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CX. Commercial field of sweet potatoes in the Middle South.

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mone quinquefolia, appearing before the basal lvs. March–June. Common in woods and open fields. L.B.C. 10:964. Gn. 35:408; 63, p. 277; 76, p. 305. J.H. III. 48:388. B.M. 866. I.H. 6:211. Var. **flòre-plèno**, Hort. Fls. double. Very pretty. L.B.C. 8:770. F.S. 11:1155. R.B. 11:205.

K. C. Davis.

SYNECHÁNTHUS (Greek, *continuous* and *flower*, alluding to the arrangement of the infl.). *Palmàceæ*. Unarmed gregarious palms, grown in the warmhouse: trunk slender, annulate, often stoloniferous: lvs. terminal, equally pinnatisect, segms. broad or narrow, membranaceous, acuminate, plicately nerved: spadices several, long- and slender-peduncled, the floriferous erect; spathes several, tubular, membranaceous, persistent: fls. green or the male purplish, minute, arranged in 1–2 rows in alternate elongated groups, the superior in the groups male, the inferior female: fr. reddish yellow, shining, ellipsoid, 1-seeded. Three species, Cent. Amer. and Colombia. *S. fibròsus*, Wendl.

3757. Syndesmon thalictroides. (×½)

Trunk 4 ft. high, green: lvs. 4 ft. long, erect and spreading; lfts. numerous, 1–1½ ft. long, spreading and rather pendulous, linear-lanceolate: spadices one-third as long as the lvs., the branches many, very slender, forked: fr. orange-red. Cent. Amer. B.M. 6572.

SYNGÒNIUM (Greek name, said to refer to the cohesion of the ovaries). *Aràceæ*. Tropical American woody climbing or creeping plants, with milky juice and sts. rooting and lf.-bearing at the nodes: lvs sagittate, becoming with age pedately 5–9-parted, on long petioles, with a persistent accrescent sheath: peduncles short: spathe yellowish or whitish green; tube small, ovoid, persistent; spadix shorter than the spathe: staminate fls. with 3–4 stamens, pistillate fls. with oblong-ovoid 2- or abortively 1-loculed ovary: seeds solitary in the locules, obovoid or globose, black.—About 10 species, W. Indies and Mex. to Brazil. Monographed in DC. Mon. Phan., vol. 2, 1879.

podophýllum, Schott. A tender creeping plant: lvs. becoming 5–7-pinnatisect, 4–6 in. long; petioles becoming 15–20 in. long: tube of the spathe 1–1½ in. long; blade of the spathe 2½ in. long, greenish outside, white within. Mex. The typical form is probably not in cult.

Var. **albolineàtum**, Engl. (*S. albolineàtum*, Bull.), has whitish costæ and lateral nerves. Offered by John Saul, 1893, presumably as a tender foliage plant.

F. W. Barclay.

SÝNTHYRIS (Greek, *together* and *little door* or *valve*, the valves of the capsule long adhering below to the short placentiferous axis). *Scrophulariàceæ*. Hardy herbaceous perennials, glabrous or pilose: rhizome thick: lvs. radical, petioled, ovate or oblong, crenate or incisely pinnatisect: peduncles scape-like, simple: fls. racemose or spicate, blue or reddish; calyx 4-parted, segms. narrow; corolla-tube very short or almost none, subrotate-campanulate, 4-lobed or none; stamens 2: caps. compressed, obtuse or emarginate, 2-grooved.—About 15 species, natives of W. N. Amer. Synthyris is nearly related to Wulfenia of S. E. Eu. and the Himalayas, but the anther-cells are not confluent and the seeds are discoidal. In their native region they are summer-blooming plants with small purplish or flesh-colored spikes or racemes. Border plants.

renifórmis, Benth. (*Wulfénia cordàta*, Greene). A tufted plant about 1 ft. high: lvs. glabrous, orbicular-reniform, crenately incised, the small lobes sharply toothed, 1–3 in. diam.; petioles 3–6 in. long: infl. a raceme about 5 in. long with about 40 purple-blue fls. which are ⅜in. across; pedicels slender and short; calyx-lobes lanceolate. Ore. and Wash. Gn. 74, p. 165.—In England this plant is considered a winter bloomer; it flowers there in Feb. or March, occasionally Nov.

rotundifòlia, Gray. Nearly or quite stemless: lvs. tufted, cordate-orbicular, 1–2 in. diam., long-petioled, doubly crenate, or crenate-incised, slightly pubescent: scape 4–6 in.: fls. few in a terminal raceme, blue or purple; calyx-lobes ovate, acute. Shady coniferous woods, Ore.

F. Tracy Hubbard.

SYRÍNGA (of doubtful meaning; probably from *syrinx*, pipe, because pipes are made from the straight stems of Philadelphus by removing the pith, and the name Syringa had been originally applied to Philadelphus but was transferred to the lilac. Philadelphus is still popularly called Syringa). *Oleàceæ*. Lilac. Ornamental woody plants grown chiefly for beautiful and showy often fragrant flowers.

Deciduous, rarely evergreen (*S. sempervirens*), shrubs or small trees: lvs. opposite, entire or rarely pinnate, exstipulate: fls. in panicles; calyx small, campanulate, 4-toothed; corolla salverform, with cylindrical tube and 4-lobed limb; stamens 2; ovary 2-loculed: fr. a leathery, oblong or oval caps., loculicidally dehiscent, with 2 winged seeds in each locule. (Fig. 3758.) In *S. sempervirens* the caps. is fleshy, one-seeded, and drupe-like, though dehiscent.—About 30 species from S. E. Eu., to the Himalayas, N. E. Asia, and Japan.

The lilacs are mostly large shrubs with bright green medium-sized foliage and with large showy panicles of lilac, purple, or white flowers followed by brown insignificant capsules. They are among the most popular and ornamental flowering shrubs, and hardly any garden or park is found without them. The fragrance of the common lilac is very sweet, as also of *S. oblata* and *S. pubescens*. The strong odor of *S. chinensis* is not agreeable to everyone. *S. villosa* and *S. Josikæa* are almost scentless. *S. amurensis* and its allies have only a slight odor similar to that of the privet. Almost all species are hardy North, but *S. emodi* is somewhat tender; also, *S. pekinensis* is not quite so hardy as *S. amurensis* and *S. japonica*. The lilacs are very showy in bloom, especially when massed in groups, and groups as a rule are the more effective the fewer different varieties they contain. The mixing of species and varieties differing in habit and blooming season only spoils the effect, and so does too great a variety of colors. *S. japonica* is the only real tree of the genus; it attains a height of 30 feet. *S. vulgaris*, *S. amurensis*, and *S. pekinensis* sometimes grow into small trees or at least large shrubs 10 to 20 feet high. *S. persica* is one of the smallest species and seldom exceeds a few feet. The first in bloom are *S. affinis* and *S. oblata*, followed closely by *S. vulgaris*, *S. chinensis*, *S. pubescens*, *S. Julianæ*, *S. persica*, *S. vil-*

3758. Capsule of Syringa vulgaris. (×3)

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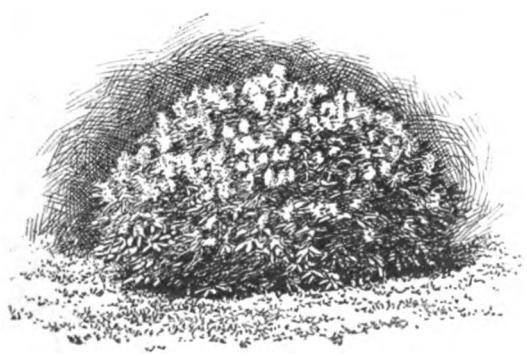
losa, *S. emodi*, and *S. Josikæa;* after the middle of June *S. amurensis* and *S. pekinensis* come into bloom, followed by *S. japonica* as the last, blooming in the North in the beginning of July. *S. amurensis* and *S. pekinensis* sometimes bloom sparingly a second time in fall. The foliage is bright green and handsome, but drops comparatively early in fall, especially in *S. japonica*, without assuming any fall coloring as a rule. In *S. oblata* the foliage turns to a deep vinous red and remains until November. In *S. pekinensis* it is retained until late in fall and finally assumes a purplish hue or turns pale yellow.

The foliage is not much attacked by insects, but a fungus, *Microsphæra alni*, late in summer often covers the whole foliage of *S. vulgaris* and also of *S. chinensis* and *S. persica* with a white mealy coat, while *S. oblata* is but rarely troubled with this fungus and the other species never. Much damage is sometimes done by a borer, *Trochilium denudatum*, which lives in the stems and branches of *S. vulgaris*, but is rarely found in any other species.

After blooming, the inflorescence should be removed if possible and the pruning be done as far as necessary. Pruning in winter or spring would destroy a large part of the flower-buds for the coming season. Lilacs grow in almost any kind of soil, but a rich and moderately moist one is the most suitable. They are easily transplanted at any time from fall to spring. *S. vulgaris* and its numerous varieties are the most popular of the lilacs on account of their early and profuse blooming, their sweet fragrance, and the variety of colors ranging from dark purple to lilac, pink, and white. The double-flowered varieties keep the blooms longer, but the panicles are less graceful and they usually do not bloom so profusely as the single ones; they also remain mostly dwarfer and have a more compact habit. The faded flowers do not fall off, but remain on the inflorescence; this gives the plant a very unsightly appearance if the faded panicles are not removed. W. J. Stewart suggests a word of warning against lilacs not on their own roots, because of the attacks of borers and the bad habit of suckering in some cases.

Some of the best single-flowered varieties are the following:

SINGLE-FLOWERED LILACS.—*White:* Alba grandiflora; Alba pyramidalis; Frau Bertha Dammann, A.F. 12: 1078; Madame Moser; Marie Legraye, one of the very best, B.H. 29:135; Princess Marie; Princess Alexandra is a favorite variety of this class in America.—*Blue, lilac, or pink:* Ambroise Verschaffelt, pale pink; Dr. Lindley, pinkish lilac, F.S. 14:1481; Géant des batailles, bluish lilac; Geheimrath Heyder, light lilac; Gigantea, bluish red; Gloire des Moulins, pale pink, G.M. 44:499; Goliath, purplish lilac; Lovaniana, light pink; Macrostachya, light pink; Sibirica, purplish lilac; Trianoniana, bluish lilac.—*Red:* Aline Mocqueris, dark red; Charles X (Caroli), dark lilac-red, A.F. 12:1076. F. 1873, p. 76; Marlyensis, sometimes called Rubra de Marley, lilac-red; Rubra insignis, purplish red.—*Dark purple:* Philemon; Ludwig Spaeth (Andenken an Ludwig Spaeth, Louis Spaeth), very large panicles, the best of the dark varieties; Negro, deep violet-purple; Congo, deep wine red.



3759. Syringa villosa.

DOUBLE-FLOWERED LILACS.—*White:* Madame Abel Châtenay, compact panicles; Madame Casimir-Perier, large graceful panicles, one of the best; Madame Lemoine, large fls. in dense panicles; Obélisque; Virginité, white and pink.—*Blue, lilac, or pink:* Alphonse Lavallé, bluish lilac, A.F. 12:1077; Belle de Nancy, fls. pink with white center; Charles Baltet, lilac-pink; Condorcet, blue, A.F. 12: 1074; Doyen Keteleer, lilac-blue; Jean Bart, pinkish violet; Lamarck, pale lilac, large, rather loose panicles; Lemoinei, lilac-pink, B. H. 28:174; Léon Simon, changing from pinkish to bluish lilac. Gt. 43:1407; Maxime Cornu, pinkish lilac; Michel Buchner, pale lilac, large and very double fls.; President Carnot, pale blue.—*Purple:* Charles Joly, dark purplish red, one of the darkest; Comte Horace de Choiseul, lilac-purple; La Tour d'Auvergne, violet-purple.

3760. Syringa villosa. ×½)

The lilacs have been favorite forcing plants in France for more than a century and are nowadays among the most important cut-flowers during the winter season in France as well as in Germany and England. They are on the market from the end of September until they bloom outdoors. Charles X is considered one of the very best for forcing. Marlyensis, Marie Legraye, Alba virginalis, Ludwig Spaeth, and other varieties are also good for forcing. Of the double-flowered varieties the following have proved adapted for forcing: Madame Casimir-Perier, Madame Lemoine, Charles Baltet, Jean Bart, Léon Simon, *S. chinensis duplex*, and others. Either grafted plants or plants on their own roots are used. Both force equally well, but grafted lilacs can be grown into plants well set with flower-buds and suited for forcing in two or three years, while plants grown from cuttings require four to six years. Marlyensis is always used on its own roots and propagated either by seeds, cuttings, or division. Special attention must be given to pruning in order to have well-branched plants of good compact habit (see Fig. 1555, Vol. III, p. 1265). The lilac has nothing like the commercial importance for forcing in America that it has in Europe, but the appreciation of it for winter bloom is on the increase in this country.

Lilacs are generally forced in pots, being potted usually in July or in the fore part of August, that they may fill the pots with new roots before winter. Some growers pot the plants in spring or in the preceding fall. This practice is of especial advantage if the plants are intended for very early forcing. These early potted plants are then plunged into the ground outdoors, mulched, well watered and regularly manured; after June, when the young growth is almost finished, only enough water is given to prevent wilting. When the flower-buds have been formed, more water is given until they have reached their full size. It is essential to keep the plants rather dry in fall, so that the wood may ripen thoroughly and early. When the leaves have fallen off, the plants are stored away in convenient places, where they are sheltered from severe frost. Sometimes the lilac, especially *S. marlyensis*, is forced from balls of earth which are not potted, but this does not always give satisfactory results.

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About three to four weeks is required to force the plants into bloom with the temperature recommended below. The first days after bringing the plants into the forcing-room, a temperature of 55° to 60° may be given, gradually rising to 78° to 88° and maintained as equally as possible until the panicles are fully developed and the first flowers begin to expand; then the temperature is lowered to 60° to 66°, and when the panicles are about half open the plants are tranferred to a cool greenhouse. Hardening-off is essential to ensure good keeping qualities of the flowers. The red-flowered varieties are often forced in darkened rooms in order to have the flowers blanched or only slightly colored. The shade of color depends entirely on the time when full light is given and also on the temperature. Show plants in pots

3761. Syringa vulgaris.—The common lilac. (×⅓)

should be grown in full light to have the foliage well developed. When the temperature is higher than 76°, frequent syringing is necessary. It is, of course, possible to force lilacs in a lower temperature, and this will even be advisable if the longer time required does not count. Full advice for commercial lilac-forcing is given by Fr. Harms in "Flieder und Asparagus," a book devoted almost exclusively to lilac-forcing.

Interesting experiments recently conducted have shown that the lilac is more readily forced when the plants are subjected to the influence of ether during forty-eight hours shortly before forcing. An account of these experiments by W. Johannsen is entitled "Das Ætherverfahren beim Frühtreiben mit besonderer Berückrichtigung des Flieders." That the ether has a particular effect on the metamorphosis and regeneration of the albuminoids in the plant has been stated recently by other botanists also.

Lilacs may be propagated by seed, which is sown in spring. This method is usually practised only with the more common typical species. The many varieties and rarer kinds are usually propagated by greenwood cuttings under glass in June (or in early spring from forced plants), by hardwood cuttings, by grafting, and also by suckers and division, especially in the case of *S. chinensis*, *S. persica*, and *S. vulgaris*. As a stock, *S. vulgaris* is mostly used and sometimes ligustrum. *S. japonica* will probably prove to be a good stock. *S. villosa*, though readily growing from seed and of vigorous habit, is not to be recommended. Budding in July and August is the most extensively practised method. Grafting is done either in April or May in the open or in February or March in the greenhouse on potted stock. Almost any kind of grafting may be employed as the lilac unites readily. Crown-grafting is to be preferred in order to avoid the troublesome suckers. Plants intended for forcing but deficient in flower-buds are sometimes grafted in October or early in November with branches well set with flower-buds and forced in January or later.

Forcing lilacs.—Most of the lilacs used by American commercial florists for forcing are imported. Care should always be taken to procure pot-grown plants, that is, plants that have been grown in pots the previous summer. The florist who wishes to grow his own plants should lift them in the field in April or before the growth starts and pot them without losing much root. Plunge them out-of-doors during summer and give them plenty of water. This treatment will insure a good growth and the check the plants receive from lifting will induce them to form new flower-buds. These plants will force with the greatest certainty. It is well to allow five weeks for the earliest forcing. A strong heat is necessary, beginning at 60° for the first few days and increasing to 75° to 80°, with a daily watering and syringing several times. After the flowers begin to open, the syringing can be discontinued and when fully expedient the plants are better removed to a coolhouse, where they will harden off and be much more serviceable when cut. As the season advances, say March and April, less heat is needed. They will then force in any ordinary house where the night temperature is about 60°F. The Persian lilac, on account of its abundance of bloom and delicate truss, is very desirable, but this must be forced almost in the dark to produce white flowers. Marie Legraye is for all purposes the most useful lilac which has been used for forcing. (Wm. Scott.)

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KEY TO THE SPECIES.

A. *Tube of corolla much longer than calyx; anthers sessile, not exserted.*
B. *Panicles on leafy branches, usually terminal: lvs. whitish beneath.*
C. *Infl. upright.*
D. *Anthers not exserted.*
E. *Stamens inserted near the middle of the tube; corolla-lobes nearly upright* ..... 1. Josikæa

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EE. *Stamens inserted below the mouth of the tube; corolla-lobes spreading*..... 2. **villosa**
DD. *Anthers exserted about one-half above the mouth: lvs. very white and glabrous beneath*.... 3. **emodi**
CC. *Infl. nodding or pendulous: corolla-lobes little spreading*..... 4. **reflexa**
BB. *Panicles from lateral buds, without lvs. at the base; terminal bud suppressed.*
C. *Anthers dark violet, inserted much below the mouth: lvs. more or less pubescent beneath, at least while young.*
D. *Branchlets and lvs. above glabrous*..... 5. **pubescens**
DD. *Branchlets and lvs. above pubescent*..... 6. **Julianæ**
CC. *Anthers pale: lvs. glabrous except in No. 7.*
D. *Base of lvs. truncate or cordate.*
E. *Lvs. roundish or broadly ovate.*
F. *Young lvs. more or less finely pubescent: infl. loose*..... 7. **affinis**
FF. *Young lvs. quite glabrous or minutely glandular: infl. dense*..... 8. **oblata**
EE. *Lvs. ovate*..... 9. **vulgaris**
DD. *Base of lvs. cuneate.*
E. *Shape of lvs. ovate-lanceolate*. 10. **chinensis**
EE. *Shape of lvs. lanceolate*.....11. **persica**
AA. *Tube short, little longer than calyx; stamens exserted: fls. white.* (*Ligustrina.*)
B. *Base of lvs. narrowed: habit spreading*.....12. **pekinensis**
BB. *Base of lvs. usually rounded: habit upright.*
C. *Under side of lvs. glabrous: lvs. abruptly acuminate: tall shrub*....13. **amurensis**
CC. *Under side of lvs. more or less pubescent; lvs. rather gradually acuminate: tree*.....14. **japonica**

Section EUSYRINGA.

Group VILLOSÆ.

1. **Josikæa,** Jacq. Shrub, attaining 12 ft., with upright, stout, terete branches: lvs. broadly elliptic to elliptic-oblong, acute at both ends, finely ciliate, dark green and shining above, glabrous or pubescent on the midrib beneath, 2½–5 in. long: fls. violet, short-pedicelled or almost sessile, clustered, in rather narrow panicles 3–7 in. long; corolla with the half-upright lobes ¾in. long; stamens inserted somewhat above the middle of the tube. June. Hungary. B.M. 3278. B.R. 1730.—Less handsome than most other species, but valuable for its late blooming season. Var. **pállida,** Hort., has pale violet fls.; var. **rúbra,** Hort., reddish violet

2. **villòsa,** Vahl (*S. Bretschneid* [illegible] *òdi* var. *ròsea*, Cornu). Figs. 3759, [illegible], 8 ft. high, with rather stout, upright, terete and warty branches: lvs. broadly elliptic to oblong, acute at both ends, finely ciliate, bright green and dull above, pubescent usually only near the midrib, rarely glabrous beneath, 3–7 in. long: fls. pinkish lilac or whitish, short-pedicelled, in broad or somewhat narrow usually pubescent panicles, 3–7 in. long, rachis terete; lobes spreading, tube about ½in. long; stamens inserted near the mouth. May, June. China to Himalayas. R.H. 1888: 492; 1914, p. 333. G.F. 1:521. Gn. 39, p. 91. Gt. 44, p. 500. G.W. 16, p. 138. G. 13:519. A.F. 24:371. B.M. 8292.—A hybrid between this and the preceding species is **S. Hénryi,** Schneid. (*S. Bretschneideri hýbrida*, L. Henry). Intermediate between the parents, but more similar to *S. villosa:* lvs. villous along the midrib: infl. large, to 10 in. long, more pyramidal and looser: corolla ¾in. long, pale violet-purple, with the stamens just below the mouth. R.H. 1902:40. J.H.S. 27, p. 800. "Lutèce" is scarcely different. Var. **eximia** (*S. Josikæa eximia*, Froebel) has compact large panicles of reddish rose fls. changing to light pink. G.C. III. 42:280. M.D.G. 1901:561. M.D. 1907, p. 262. "H. Zabel" is similar, but the fls. are reddish lilac.

3. **emòdi,** Wall. (*S. villòsa* var. *emòdi*, Rehd.). Shrub, to 15 ft.: branchlets brownish or dark olive-green, dotted with pale lenticels: lvs. elliptic to oblong, acute at both ends, white and glabrous beneath, 6–8 in. long: infl. narrow, 3–6 in. long, with leafy bracts; rachis angular: corolla pale lilac or whitish, not pleasantly scented, tube ⅜in. long; anthers partly exserted; calyx obscurely lobed. Himalayas. B.R. 31:6. R.H. 1876, p. 368. Gn. 39, p. 106. R.B. 28:193.—Not quite hardy in Mass. There are varieties with yellow lvs., var. **aúrea,** Simon-Louis, and with yellow-variegated lvs., var. **aúreo-variegàta,** Hort.

4. **reflèxa,** Schneid. Shrub, to 12 ft.: branches gray or purplish gray, dotted with lenticels: lvs. ovate-oblong to lance-oblong, sometimes elliptic-obovate, acuminate, cuneate at the base, glabrous above, villous beneath chiefly along the veins, 3–5 in. long: infl. nearly cylindric, nodding or pendulous, 5–7 in. long and 1½–2 in. across; rachis, pedicels, and calyx sparingly villous or calyx nearly glabrous: corolla pinkish, ½–¾in. long with nearly upright lobes: fruiting panicles pendulous with reflexed, slightly warty oblong caps. W. China.—A remarkable species very distinct from all others by the pendulous panicles and particularly handsome before the fls. open because of the carmine color of the buds.

Group VULGARIS.

5. **pubéscens,** Turcz. (*S. villòsa*, Decne., not Vahl. *S. villòsa* var. *ovalifòlia*, DC.). Shrub, 6 ft. high, with slender, somewhat quadrangular glabrous branches: lvs. roundish ovate to rhombic-ovate or ovate, shortly acuminate, ciliate, dark green and glabrous above, 1–3 in. long: fls. pale lilac, fragrant, short-pedicelled, in ovate, not very large, but numerous panicles; tube very slender; anthers violet, inserted much below the mouth. May. N. China. G.F. 1:415; 6:266. B.M. 7064. G.C. III. 38:123 (as *S. villosa* var. *pubescens*).—Free-flowering shrub of graceful habit, with handsome dark foliage.

3762. Winter twig of Syringa vulgaris, showing the absence of a terminal bud and the persistent dehisced pods. (×½)

6. **Juliànæ,** Schneid. Spreading shrub, to 6 ft.: branchlets villous: lvs. elliptic-ovate, acute or acuminate, cuneate at the base, short-pubescent above, pale and more villous-pubescent beneath, particularly on the veins, 1–2 in. long: infl. 2–4 in. long, rather loose; rachis and pedicels slightly hairy and like the glabrous distinctly toothed calyx purplish violet: corolla lilac-purple outside, fragrant, small, the spreading lobes white inside; anthers violet, inserted a little below the mouth. May,

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June. W. China. B.M. 8423.—A handsome and distinct species similar to *S. pubescens;* the deeper color of the fls. is heightened by the purplish violet color of the whole infl.

7. **affinis,** L. Henry (*S. oblàta* var. *álba*, Hort.). Slender, loosely branched shrub; lvs. broadly ovate, acuminate, truncate at the base, finely pubescent while young, particularly on vigorous shoots, on flowering branchlets sometimes glabrous or nearly so, 1½–2½ in. long and 1⅛–2⅛ in. broad: infl. slender and rather loose, 4–5½ in. long: calyx distinctly 4-toothed; corolla white, tube ½in. long. May. N. China. Var. **Giráldii,** Schneid. (*S. Giráldii*, Lemoine, not *S. Giraldiàna*, Schneid.). Lvs. usually more densely pubescent while young: infl. 5–6 in. long, fls. purplish lilac; rachis, pedicels, and calyx purple-violet. N. W. China. R.H. 1909, p. 335.—The earliest of the lilacs to bloom and the fls. do not suffer from frost as do those of *S. oblata.* Hybrids of var. *Giraldii* with *S. vulgaris* have been raised recently by Lemoine, which flower nearly two weeks before the earliest varieties of *S. vulgaris;* such are "Lamartine" with rose-mauve fls. and "Mirabeau" with rosy lilac fls.

8. **oblàta,** Lindl. Shrub or small tree, 12 ft. high, rather compact: lvs. roundish ovate or reniform, often broader than long, cordate, short-acuminate, bright green, their margins usually reddish while young, 2½–4½ in. across: fls. pale lilac to purple-lilac, in dense subglobose or pyramidal panicles, 3–5 in. long; pedicels about as long as the distinctly toothed calyx. May. N. China. G.F. 1:221. A.G. 22:183. G.W. 5, p. 549. B.M. 7806. G. 36:355.—Next to the preceding species the earliest to bloom and handsome in fall with its vinous or russet-red foliage. A hybrid with the following species is **S. hyacinthifiòra,** Rehd. Intermediate between the parents, with broadly ovate lvs., turning purplish in fall. Only known in the double form, var. **plèna,** Lemoine. Many or perhaps most of the newer double-fld. varieties have originated by recrossing this form with varieties of *S. vulgaris.*

9. **vulgàris,** Linn. Figs. 3758, 3761, 3762. Upright shrub or small tree, 20 ft. high: lvs. ovate, truncate or slightly cordate, acuminate, bright green, 2–4 in. long: fls. lilac, blue, purplish, or white, in large panicles. May. S. E. Eu. to Caucasus and Afghanistan; sometimes escaped from gardens in the eastern states. B.M. 183. Gn. 53, p. 156. M.D.G. 1899:205. F.E. 22:5. R.H. 1903, pp. 126–128.—The most important of the older original varieties are the following: Var. **álba,** Ait., branches yellowish gray: fls. white; buds yellowish green; blooms a week earlier than the other varieties. A.F. 12:1081. Var. **cærùlea,** Ait. Fls. blue, in rather loose panicles. Var. **rùbra,** Loud. Fls. purplish red, in large and rather dense panicles. Here belong also var. **marlyénsis,** Hort., and Charles X. Var. **violàcea,** Ait. Fls. violet-lilac, in rather loose panicles. Var. **plèna,** Hort. With double fls. There are several varieties with variegated lvs., but these are hardly worth cultivating.

10. **chinènsis,** Willd. (*S. persica* × *S. vulgaris. S. dùbia,* Pers. *S. rothomagénsis,* Loud. *S. varìna,* Dum.-Cours.). Shrub, attaining 12 ft., with slender, often arching branches: lvs. ovate-lanceolate, acuminate, 2–4 in. long: fls. purple-lilac, red, or white, in large and broad panicles. May. Originated in 1777 in Rouen, France. R.H. 1883, p. 80. F. 1873, p. 76 (as *S. persica*). G.M. 44:498; 50:431.—Very free-flowering. Var. **álba,** Loud., with white fls. Var. **meténsis,** Simon-Louis, with pale purplish fls. Var. **saugeàna,** Loud. (var. *rùbra,* Lodd.), with deep purplish red fls. Var. **dùplex,** Lemoine, with double purplish lilac fls.

11. **pérsica,** Linn. Fig. 3763. Shrub, attaining 5–10 ft., with slender, arching branches: lvs. lanceolate, acuminate, 1½–3 in. long: fls. pale lilac or whitish, in rather loose, broad panicles, about 3–4 in. long; pedicels as long as or longer than calyx. May, June. Caucasus to Afghanistan. B.M. 486. Var. **álba,** Loud. (*S. Sleèncruysii,* Hort.). Fls. white. Var. **rùbra,** Hort. Fls. red. Var. **laciniàta,** Vahl (*S. pteridifòlia, S. filicifòlia,* and *S. pinnàta,* Hort.). With pinnately lobed or pinnatifid lvs., of dwarfer habit and with smaller panicles. R.H. 1878, pp. 452, 453; 1883, p. 80; 1901, pp. 40, 41.

Section LIGUSTRINA.

12. **pekinénsis,** Rupr. (*Ligústrina amurénsis* var. *pekinénsis,* Maxim. *Ligústrina pekinénsis,* Regel). Large shrub, attaining 15 ft., with slender, spreading

3763. Syringa persica, one of the common lilacs. (×⅓)

branches, brownish red when young: lvs. ovate to ovate-lanceolate, usually narrowed at the base, acuminate, rather dark green above, pale or grayish green and glabrous beneath, 2–4 in. long, 1–1½ in. broad: fls. yellowish white in large glabrous panicles, usually in pairs at the ends of branches; stamens about as long as limb. June. N. China. G.F. 3:165; 7:385. M.D.G. 1899:425.—Large shrub, of excellent habit, with handsome foliage retained until late in fall; flowers profusely only when older. Var. **péndula,** Hort. With very slender, pendulous branches.

13. **amurénsis,** Rupr. (*S. ligústrina,* Hort. *Ligústrina amurénsis* var. *mandshùrica,* Maxim. *Ligústrina amurénsis,* Regel). Shrub, attaining 12 ft., with spreading or upright branches: lvs. broadly ovate to ovate, usually rounded at the base, bright green above, pale or grayish green and glabrous beneath, 2–6 in. long, 1½–2½ in. broad: fls. yellowish white, in large, rather loose glabrous panicles; stamens almost twice as long as limb. June. Manchuria. Gt. 12:396; 45, p. 64. G.F. 2:271. Gn. 12, pp. 623, 624. R.H. 1877, pp. 453–455.—Sometimes cult. under the name of *S. sibírica* or *S. sibírica álba.*

14. **japónica,** Decne. (*Ligústrina amurénsis* var. *japónica,* Maxim.). Fig. 3764. Pyramidal tree, attain-

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ing 30 ft., with upright branches: lvs. broadly ovate to broadly elliptic, rounded or slightly cordate at the base, shortly acuminate, pale green beneath, and usually pubescent when young, 3–7 in. long: fls. yellowish white, in very large pubescent panicles often 1 ft. or more long; stamens little longer than limb. June, July. Japan. B.M. 7534 and S.I.F 2:63 (as *S. amurensis*). G.C. II. 25:561. Gn. 76, p. 356. G. 29:549. G.F. 2:293, 295. M.D G. 1899:424; 1907:381. Gt. 37:217. Mn. 4, p. 5; 7, p. 167. R.H. 1894, p. 325.—Very desirable free-flowering tree and quite hardy N. Var. **argéntea**, Temple, has the lvs. variegated with silvery white.

S. albo-rósea, N. E. Br...S. tomentella.—*S. Koehneàna*, Schneid. (S. velutina, Hort., not Komarov). Allied to S. pubescens. Young branchlets puberulous: lvs. oval to oblong-lanceolate, pubescent on both sides, 2–3 in. long: infl. 3–4 in. long, pubescent: fls. pale lilac. China.—*S. Komaróvii*, Schneid. Allied to S. villosa. Lvs. oblong-ovate, pubescent beneath, 4–6 in. long: infl. narrowly pyramidal, to 6 in. long, pubescent: corolla lilac; anthers partly exserted. W. China. Var. *Sargentiàna*, Schneid. Branchlets slightly pubescent: infl. usually somewhat larger: corolla purple; anthers usually scarcely exserted. W. China.—*S. Meyeri*, Schneid. Allied to S. pubescens. Small shrub: lvs. elliptic-ovate, sparingly pubescent beneath: infl. rather dense: fls. lilac with very slender tube over ½in. long. N. China. Blooms when scarcely a foot high.—*S. pinnatifólia*, Hemsl. Allied to S. persica. Lvs. pinnate, 2–3½ in. long with 9–11 sessile and decurrent lfts.: infl. slender, about 2 in. long: fls. whitish pink, the tube ½in. long. W. China. G.C. III. 55:269.—*S. Rehderiàna*, Schneid. Allied to S. villosa. Branchlets tomentose: lvs. elliptic, pubescent on both sides, 3–4 in. long: infl. broadly pyramidal, to 7 in. long, villous: fls. white. W. China.—*S. Sargentiàna*, Schneid.=S. Komarovii var. Sargentiana.—*S. sempérvirens*, Franch. Shrub, to 4 ft., glabrous: lvs. persistent, coriaceous, broadly oval, obtuse or acutish, 1–1¼ in. long: fls. white, ¼in. long, in dense panicles 2–3 in. long: fr. fleshy, dehiscent. S. W. China. It looks more like a privet than like a lilac; not hardy N.—*S. Sweginsówii*, Koehne & Lingelsh. Allied to S. villosa. Lvs. ovate, usually rounded at the base, pubescent beneath only near the veins, 2–4 in. long: infl. to 10 in. long, with purple rachis: fls. yellowish white suffused with pink, fragrant, the tube about ¼in. long. E. Asia. G.C. III. 57:345. M.D. 1910, p. 112.—*S. tomentélla*, Bur. & Franch. (S. albo-rosea, N. E. Br.). Allied to S. villosa. Branchlets glabrous or short-pubescent: lvs. elliptic to oblong-lanceolate, more or less pubescent beneath, 1–3½ in. long: infl. dense, to 7 in. long, puberulous; fls. lilac-pink; tube over ½in. long. W. China. M.D. 1910, p. 112.—*S. velùtina*, Hort., not Komarov=S. Koehneana. The true S. velutina, Komarov, is apparently not in cult.; it differs chiefly in its larger lvs. and the glandular petioles and infl.—*S. Wilsonii*, Schneid. Allied to S. villosa. Lvs. elliptic-ovate, to elliptic-lanceolate, pubescent beneath near the veins, 2½–5 in. long: infl. broad, to 6 in. long, glabrous or nearly so; fls. white or lilac, tube about ½in. long. W. China.—*S. Wólfii*, Schneid. Allied to S. villosa. Lvs. elliptic-oblong, nearly glabrous: infl. to 12 in. long: fls. lilac, fragrant, ¼in. long. N. China. Remarkable for its very large panicles.—*S. yunnanénsis*, Franch. Allied to S. villosa. Shrub: lvs. elliptic-oblong to oblong-lanceolate, glaucescent beneath, glabrous, 1½–3½ in. long: infl. slender, 3–6 in. long, puberulous: fls. pinkish, with upright-spreading lobes. S. W. China.

ALFRED REHDER.

SYZÝGIUM (from the Greek, *united*, referring to the calyptrate petals). *Myrtàceæ*. Trees and shrubs of the tropics of the Old World, variously defined and by some authors made a section of Eugenia: from Eugenia proper the group differs in the united petals, the calyx truncate or with a 4–5-lobed limb and no staminal disk: fls. small, in compact clusters: fr. small 1- or 2-seeded berries. As defined by Niedenzu, the genus has about 140 species. One or two names under this genus appear in the trade. For *S. jambolana*, see *Eugenia jambolana*, p. 1163, Vol. II.

operculàtum, Niedz. (*S. nervósum*, DC. *Eugènia operculàta*, Roxbg.). A large evergreen tree with 4-angled or nearly terete branches: lvs. opposite, broad-ovate or elliptic, rounded or somewhat acuminate at apex and narrowed at base, 3–8 in. long, dark green and glossy, the primary lateral nerves few and separated: fls. in 3's and collected into a more or less thyrsoid infl., greenish: berry ½in. or less diam., juicy, edible. Himalaya.—This name appears recently in Calif.: young plants described as having handsome foliage; said to be an acquisition.

L. H. B.

3764. Syringa japonica. (×⅓)

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TABEBÙIA (Brazilian name). *Bignoniàceæ*. Ornamental trees grown chiefly for their showy flowers.

Evergreen: lvs. opposite, simple or digitate, entire or serrate: fls. in terminal panicles or racemes, rarely solitary; calyx irregularly splitting or unequally 3–5-lobed; corolla funnelform-campanulate; stamens included; disk annular or cupulate; ovary with the ovules in many series: caps. more or less compressed, usually elongated, glabrous or scaly.—About 90 species in Trop. and Sub-trop. Cent. and S. Amer. By Bureau and by Schumann, Tabebuia is limited to the 5 or 6 species with simple lvs., and the species with digitate lvs. are referred to Tecoma, while the Tecoma of this work is called Stenolobium by these authors. See, also, *Bignonia*.

The tabebuias are upright trees with large evergreen foliage simple or digitate and with large pink, white, or yellow flowers in terminal, usually few-flowered panicles or racemes or sometimes solitary. They are suited for cultivation in tropical or subtropical countries only and are sometimes grown in southern California and Florida. They grow luxuriantly in rich or well-manured soil and are easily propagated by cuttings and also by air-layering.

A. *Lvs. simple.*

leucóxyla, DC. (*Bignònia leucóxyla*, Vell. *B. pállida*, Lindl.). Fig. 3765. Evergreen tree or shrub: lvs. elliptic-oblong to obovate-oblong, obtuse or sometimes marginate at the apex, glabrous, dark green, with distinct pale midrib, 4–7 in. long: fls. in few-fld. terminal racemes; corolla funnel-shaped, about 2 in. long, with yellow tube and pale lilac limb. Brazil. B.R. 965.

3765. Tabebuia leucoxyla. (×⅔) C, winged seed.

AA. *Lvs. digitate.*

B. *Fls. pink.*

triphýlla, DC. (*Bignònia leucóxylon*, Linn. *Técoma leucóxylon*, Mart.). Evergreen tree: lvs. long-petioled, digitate; lfts. 3–7, usually 5, stalked, oblong-lanceolate, entire, glabrous, 1–2½ in. long: fls. in usually few-fld., loose panicles or 1 or 2; corolla funnelform, with large, spreading limb, rosy pink or nearly white, suffused with pink, 2 in. long; calyx 2-lipped: caps. linear, 6–8 in. long. W. Indies, Guiana.

rósea, DC. (*Técoma rósea*, Bertol.). Evergreen tree: lvs. digitate; lfts. 5, rarely 3, long-stalked, ovate to oblong, acuminate, entire: fls. in many-fld. terminal panicles; corolla funnelform-campanulate, with short tube and large spreading lobes, rosy pink; calyx campanulate, obscurely 2-lobed, almost truncate. Guatemala.

BB. *Fls. yellow.*

chrysántha, Nichols. (*Técoma chrysántha*, DC.). Evergreen tree: lvs. digitate; lfts. 5, ovate, acuminate, entire, tomentose, 4–7 in. long, long-stalked: fls. in terminal dense racemes, yellow, funnelform, 2 in. long. Caracas.

T. æsculifólia, Hemsl. (Tecoma æsculifolia, DC. Bignonia æsculifolia, Humb. & Bonpl.). Evergreen tree, about 20 ft. high: lvs. digitate, with 7 oblong-obovate lfts., pubescent above, tomentose beneath: fls. in terminal panicles, subcampanulate, orange-red, with yellow spots on the 3 lower lobes. Mex.—*T. Dónnell-Smithii*, Rose. Known in Mex. as "Primavera" and said to be one of the most beautiful trees, sometimes 4 ft. diam., and the wood very valuable: fls. beautiful golden yellow, in great abundance, usually appearing before the palmately compound lvs.: lfts. 7, oblong to ovate, acuminate, rounded or truncate at base, serrate.—*T. Pálmeri*, Rose. Tree, 18–25 ft., bearing paulownia-like fls.: lvs. opposite; lfts. 4, about 2–5 in. long, oblong, somewhat acuminate, obtuse at base: fls. white and purplish, with yellow spots, in close clusters at ends of naked branches; corolla 1¼–2 in. long. Mex.—*T. pentaphýlla*, Hemsl. (Tecoma pentaphylla, Juss.). Closely related to T. triphylla. Tree, to 60 ft.: lfts. usually 5, elliptic to oblong-obovate, obtuse or acutish: fls. rosy pink, larger. W. Indies, Cent. Amer., Venezuela. The plant intro. under this name by the Dept. of Agric. under No. 38649 is said to have orange-colored fls. and belongs probably to some other species.—*T. serratifólia*, Nichols. (Tecoma serratifolia, Don). Evergreen tree: lvs. digitate, with 4–5 oblong-ovate acuminate lfts. serrate at the apex, 3–5 in. long: fls. in terminal panicles, tubular-funnelform, yellow. W. Indies.—*T. spectábilis*, Nichols. (Tecoma spectabilis, Planch. & Lind.). Evergreen tree: lvs. digitate, with 5 stalked ovate to oblong-ovate, crenately serrate lfts.: fls. in terminal panicles, orange-yellow, funnelform-campanulate. Colombia. F.S. 9:948.

ALFRED REHDER.

TABERNÆMONTÀNA (named for J. T. Tabernæmontanus of Heidelberg, physician and botanist; died 1590). *Apocynàceæ*. Evergreen usually glabrous trees or shrubs, grown in the warmhouse.

Leaves opposite, thin or leathery: cymes rather branched, terminal or dichotomously arranged: fls. white or yellowish, small or rather large; calyx usually short, deeply or to the middle 5-lobed or -parted; corolla salver-shaped, tube cylindrical, lobes twisted; disk various; ovary with 2 distinct carpels: berries or follicles 2, globose, oblong, ovoid or recurved-reniform, smooth or 3-ribbed.—About 160 species, widely distributed throughout the tropics. See *Gonioma* for distinctions from that genus.

The East Indian rosebay, *T. coronaria*, is one of the

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best ornamental shrubs for subtropical gardens. This species and *T. Camassi*, referred in this work to Gonioma, flourish everywhere in Florida from Jacksonville southward. If they receive proper attention, tiny cuttings soon develop into dense, bushy plants 3 to 5 feet high, covered with deliciously scented flowers throughout the summer. Indeed the plants are so densely covered with buds and flowers that it is often difficult to find a sufficient supply of cuttings for propagation. *T. coronaria* has larger leaves than *T. Camassi* and the flowers are much like those of the double white oleander, while *T. Camassi* has solider and smaller blossoms. Both do well under the same treatment. In order to enjoy the beauty of the East Indian rosebay to its fullest extent, it must be planted in rich, sandy soil, not too wet and not too dry, and in places fully exposed to the sun. Only very strong pot-grown plants should be set out in the garden. This should be done during the rainy season. Avoid breaking the ball in transplanting. It is useless to transplant in November, the time when most evergreens and other plants are most successfully set out. The plants at this season have not time to become established before the first sharp frost comes, and a weakened tabernæmontana is usually killed outright by even a slight frost. Just before Christmas all the plants of this nature (bauhinias, cestrums, *Poinciana regia*, *Tristania conferta*, grevilleas, eucalypti, and so on) are banked about 18 inches to 2 feet high with dry sand, and they always come through without much damage. In April or even earlier, the banking is taken away and the plants cut back to sound wood. The tabernæmontanas look best in groups by themselves or in front of other glossy leaved evergreens. (H. Nehrling.)

A. *Fls. white.*

coronària, Willd. Crape Jasmine. Nero's Crown. A tender shrub, 6–8 ft. high: lvs. glossy green, oblong to oblanceolate: fls. white, fragrant, 1–2 in. across, in 1–8-fld. clusters in the forks of the branches; petals crimped on the margin, whence the common name. Cult. in India but native country unknown. Var. **flòre-plèno,** with double, somewhat larger, very sweet-scented fls., seems to be far more common in cult. P.M. 16:354. B.M. 1865 (as *Nerium coronarium*).—Cult. in the more southern states and also in greenhouses. Also known as Adam's apple and East Indian rosebay.

AA. *Fls. yellow.*

grandiflòra, Jacq. A small, tender shrub: lvs. oblong-ovate, sharply acuminate, 2–3 in. long, thick: fls. single, yellow, 1–2 in. long, in few-fld. clusters; corolla-lobes oval, obtuse, entire. Early fall. Carthagena, Guiana. B.M. 5226.—Rarely cult. in the more southern parts of the U. S.

T. Camàssi, Regel. See Gonioma Kamassi.—*T. dichótoma*, Roxbg. (Cerbera dichotoma, Lodd.). About 6 ft. high: lvs. oblong, acute at base, obtuse at apex, 2½–5 in. long: cymes terminal, dichotomously branched, many-fld.; fls. slightly odorous, 1 in. long. India. B.R. 27:53. L.B.C.16:1516. H.W. 3, p. 259.—*T. grandiflòra*, Hort., is listed in the American trade, presumably an error for T. grandiflora.

F. W. Barclay.
F. Tracy Hubbard.†

TACAMAHAC: *Populus balsamifera.*

TÁCCA (Malayan name). Syn., *Atáccia. Taccàceæ*, a family allied to the Dioscorea tribes. Perennial herbs from a tuberous or creeping rhizome, adapted to the warmhouse.

Leaves radical, large, petioled, sometimes undivided and entire, sometimes variously lobed or dissected: fls. at the top of erect leafless scapes in dense umbels, lurid brown or greenish; perianth 6-lobed in 2 rows; stamens 6; ovary inferior, 1-celled: fr. globose, ovoid, turbinate or elongated, usually 3-cornered or 6-ribbed, berry-like and indehiscent, rarely finally 3-valved.—About 13 species in the tropics of both hemispheres. The fl.-cluster is subtended by a few, usually 4, leaf-like or colored bracts, and intermixed with the fls. are more or less numerous, long and conspicuous, sterile, filiform pedicels, which usually droop below the fl.-cluster. Taccaceæ contains only one other genus, Schizocapsa.

A. *Lvs. much lobed.*

pinnatífida, Jack. Tender perennial herb, about 2 ft. high: rootstock globose, becoming 1 ft. through: lvs. large, usually 3-branched, the divisions pinnately cut or divided, the ultimate lobes sometimes irregular and unequal but usually ovate to lanceolate: fls. greenish, 8 lines across, many with the sterile pedicels purplish: berry nearly globular, 1 in. through. Afr., India, and Austral. L.B.C. 7:692. B.M. 7299, 7300.—According to Von Mueller's Select Extra-tropical Plants, the Fiji arrowroot is prepared from the tubers of this species. The plant thrives even on the sand-shores of tropical countries, and it is not unlikely that it will endure a temperate climate.

AA. *Lvs. not lobed.*

cristàta, Jack (*Atáccia cristàta*, Kunth). Rootstock a short conic caudex, marked with lf.-scars: lvs. 1–2 ft. long, oblong, acuminate, dark purplish green: scape longer then the lvs.: fls. dark purple, 1½ in. across, in a somewhat 1-sided umbel, with numerous pale sterile pedicels 8–10 in. long: involucral bracts 4, conspicuous, the 2 inner elliptical, narrowed to a petiole, the 2 outer revolute. Malaya. B.M. 4589. F.S. 9:860–861. Gn. 45, p. 415; 49, p. 423.—According to Gn. 45, p. 415, it requires good, rich, open soil, with ample drainage, plenty of water, and a stove temperature. In the winter season the plant should be kept in a state of partial rest.

Chantrièri, André. Plant stemless, on a fibrous, red-brown caudex: lvs. on petioles attaining a length of 28 in., which are dilated and imbricated at base, channeled and red-brown; blades oval, acute at apex, about 20 x 8–10½ in., brilliant shining green, not symmetrical at base: infl. red-brown, brilliant purple, spathes brilliant purple; fls. about 20, almost 2 in. long. Malaya. R.H. 1901, p. 541.—Resembling *T. cristata* but larger in its proportions and having more numerous long-stalked fls.

F. W. Barclay
F. Tracy Hubbard.†

TACSÒNIA (from the Peruvian name of one of the species). *Passifloràceæ*. From Passiflora, Tacsonia differs in having a long-tubular calyx, stamens and petals usually 5, the latter never wanting, corona of tubercles or very short threads, and in a short reflexed crown near the base of the fl.-tube. However, the line of demarcation between the two genera is often not well marked and Harms (Engler & Prantl's Pflanzenfamilien) unites Tacsonia with Passiflora. Masters (Trans. Linn. Soc. 27) accepts 25 species of true Tacsonia, relegating the intermediate forms largely to Passiflora. Other species have been discovered subsequently. The Tacsonias are all S. American, inhabiting the Andes. They are tendril-climbing shrubs or herbs, requiring the treatment given passifloras. Tacsonias are cult. freely in the open in Cent. and N. Calif. *T. manicata* (*Passiflora manicata*) is a common and striking red-fld. tall climber in S. Calif.

In this work, following Engler & Prantl and also Hooker, the Tacsonias are described under *Passiflora*.

TÆNÍDIA (Greek, making reference to the very small ribs of the fr.). *Umbellíferæ*. One species, a slender smooth glaucous perennial of E. Canada and U. S., *T. integerrima*, Drude, formerly known as *Pimpinella integerrima*, Gray, and *Zizia integerrima*, DC. It has little value to the horticulturist, although interesting to the collector of native plants for the hardy border. It is erect, 2–3 ft., slender, open-branched, with long-rayed umbels of small yellow fls. in spring and early summer: lvs. ternately 2-compound, the lfts. oval to lanceolate, entire, nearly or quite obtuse.

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TAGÈTES (*Tages*, an Etruscan god, or perhaps of other derivation). *Compósitæ*. MARIGOLD. American perennial and annual flower-garden herbs.

Leaves opposite or alternate, pinnately cut or rarely simply serrate: fl.-heads of various sizes, yellow or orange, marked in some species with red: strong-scented plants with opposite or alternate mostly pinnately divided lvs. that bear oil-glands: involucre of united parts forming a cup or tube, naked at base: achene angled or flattened, the pappus of a few entire mostly unequal bristles or scales: rays pistillate; disk-fls. perfect.—Species about 20, from New Mex. and Ariz. to Argentina, mostly annuals. The popular annual species known as "African" and "French" marigolds have been derived respectively from *T. erecta* and *T. patula*, both of which are native to Mex. According to Sweet's Hortus Britannicus, these two species were intro. into cult. in 1596 and 1573.

3766. Single French marigold.—Tagetes patula. (×¼)

For garden purposes Tagetes may be divided into two groups, based upon habit of growth. *T. erecta* and *T. lucida* are of upright and somewhat open growth; while *T. patula* and *T. signata* are spreading and bushy, the lower branches lying close to the ground and often rooting. The French marigolds, *T. patula*, are valuable bedding plants. Good garden forms are of even height and bushy compact growth, with a mass of good foliage and well-colored flowers appearing continuously from June until frost. In raising plants, it is preferable to grow them in pots, as this practice seems to check the plants sufficiently to cause them to bloom at a small size and more plentifully during the early summer months than if they were raised with unlimited root room. They should be planted about 1 foot apart. This species also makes attractive specimens in small pots in a few weeks from seed. Mixed seed of the double sorts will give a large percentage of good double flowers, while the seed of special named double sorts is remarkably good. Some of the single forms are very finely colored. The African marigolds, *T. erecta*, are not well suited to bedding purposes, the growth being too open, but for the mixed border or shrubbery they are excellent late-blooming subjects. This species should be grown with plenty of root room, air, and rich soil from start to finish if the largest and most double flowers are desired. The African marigolds are very useful as cut-flowers except under circumstances where their odor is objectionable.

For pot marigold, see *Calendula*.

A. *Fls. generally marked with red.*

pátula, Linn. FRENCH MARIGOLD. Fig. 3766. A hardy annual, usually about 1 ft. high and much branched from near the base, forming a compact, bushy plant: lvs. darker green than in *T. erecta*, pinnately divided; lobes linear-lanceolate, serrate: fls. smaller than in *T. erecta* and borne on proportionately longer peduncles. Mex. B.M. 150; 3830 (as *T. corymbosa*).—Both the single and double forms are grown. The species is very variable as to the color-markings of the fls. which range from almost pure yellow to nearly pure red. A dwarf variety, **nàna,** Hort., is known. Gn. 63, p. 24; 73, p. 127.

AA. *Fls. not marked with red.*

B. *Lvs. pinnately divided.*

C. *Rays numerous.*

erécta, Linn. AFRICAN MARIGOLD. Fig. 3767. A hardy annual growing about 2 ft. high, erect, branched: lvs. pinnately divided, segms. lanceolate-serrate: fls. 2–4 times as large as in *T. patula* and of one solid color, the typical color, according to DeCandolle, being a lemon-yellow. Mex.—The rays are sometimes rather 2-lipped and in one of the garden forms they are quilled. The color ranges from a light sulfur-yellow to a deep orange, many of the light yellow shades being rare amongst fl. colors. This is the common marigold of old gardens in Amer. Foliage very strong-scented.

CC. *Rays few, usually 5.*

signàta, Bartl. An annual branching species: lvs. pinnately divided into usually 12 oblong, linear, sharply serrate segms., the lower teeth awned: rays 5, yellow, roundish-obovate. Mex. R.H. 1895, p. 505. Var. **pùmila,** Hort., a dwarf, bushy form, usually less than 1 ft. high, seems to be the only form in the trade. The fls. are bright yellow and small but numerous.—The species is suited for massing or for borders.

BB. *Lvs. lanceolate, simply serrate.*

lùcida, Cav. SWEET-SCENTED MARIGOLD. A tender perennial plant, entirely distinct from the foregoing annuals in the sessile, lanceolate lvs. and small, usually 2–3-rayed fls. in dense, terminal corymbs. The fls. have a much more agreeable odor than the other species cult. Mex. B.M. 740. R.H. 1895, p. 505.—Sometimes used as a substitute for tarragon, which see.

T. lúcera is a species discovered about 1896 by T. S. Brandegee in Low. Calif. It makes a compact bush 4–5 ft. high, bearing a profusion of yellow fls. in winter. Small plants flower well in pots. See G.F. 9:67. —*T. Lémmonii*, Gray, also a shrubby nearly smooth plant about 2 ft. high, seems to be grown in Calif. It is distinctly woody but rather slender: lvs. all opposite, 3–7-foliolate, the serrulate lfts. about 1 in. long: heads about 1 in. diam., showy. Ariz. G.C. III. 27:21.

F. W. BARCLAY.

TAÌNIA (Greek, *band* or *fillet*, alluding to the shape of the lip). *Orchidàceæ*. Terrestrial warmhouse orchids. Sterile st. from a many-sheathed rhizome finally thickened into a pseudobulb: lf. single, terminal, large, long-petioled: flowering scapes arising from the rhizome, tall, leafless, base few-sheathed, bearing a simple terminal raceme: fls. pedicellate, sparse, rather large or medium-

3767. African marigold.—Tagetes erecta. (×½)

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sized; sepals about the same length, narrow, acutish to acuminate; petals similar to the rear sepal or narrower; labellum affixed to the foot of the column, erect, gibbous at base, lateral lobes erect and parallel or clasping the column, the middle lobe spreading, short, broad; pollinia 8.—About 14 species, India, S. China, and Malaya.

Fuerstenbergiàna, Schlecht. Tall: pseudobulbs ovoid, about 2 in. long, 1-lvd.: lf. erect, petioled, lanceolate, about 2 ft. long: scape slender, erect, 2½–3 ft. tall, bearing a lax 10–15-fld. raceme: fls. about 2 in. across; sepals and petals oblong-ligulate; lip oblong, 3-lobed. Habitat(?).—Closely allied to *T. penangiana.*

penangiàna, Hook. f. Not pseudobulbous: lf. 8–12 x 1½–2 in., about equaling the slender petiole: scape twice as long: sepals linear-lanceolate, ⅔in. long, acuminate; petals narrow, 5–7-nerved, spur shortly conical, obtuse; lip oblong, side lobes subacute, incurved, overlapping the orbicular, acuminate, crisped midlobe. Penang, Malayan Penins. F. TRACY HUBBARD.

TAINIÓPSIS (*like Tainia*). *Orchidàceæ.* Epiphytic plants, probably adapted to the coolhouse. Roots rather stout, with a short decumbent rhizome: pseudobulbs ovoid, slightly 4-angled, finally rugose, at apex 2-lvd.: lvs. elliptic-lanceolate, acuminate, narrowed to the petiole, lightly plicate, 1 ft. or more long: scape lateral from near the base of the pseudobulb, erect, slender, more or less exceeding the lvs.: infl. simple or slightly branched, laxly several- or many-fld.: sepals ringent, ligulate, rather obtuse, minutely puberulent outside, glabrous inside, lateral recurved, falcate, base broadened; petals obliquely linear, obtuse, recurved, glabrous, as long as the sepals; labellum curved, mobile, lanceolate-tongue-shaped, apex hastately dilatate with the margins incurved; column medium-sized, broadened toward the apex; pollinia 8. One species, Khasia Mts. and Burma, *T. barbàta,* Schlecht. O. 1915:11.
F. TRACY HUBBARD.

TALAÙMA (S. American name). *Magnoliàceæ.* Evergreen trees, grown occasionally in the warmhouse. Lvs., infl., and seeds as in Magnolia: sepals 3; petals 6 to many, imbricate in 2 rows; stamens numerous; carpels numerous, capitate or spicate, 2-ovuled.—About 30 species in the tropics of E. Asia, S. Amer., and Japan. Talauma is closely allied to Magnolia, but the carpels are indehiscent and deciduous, while those of Magnolia dehisce dorsally and are persistent.

Hódgsonii, Hook. & Thom. Tender evergreen tree, 50–60 ft. high, producing lvs. and fls. at the same time: lvs. 8–20 x 4–9 in., obovate-oblong, cuspidate or obtuse, leathery, glabrous: fls. cup-shaped, fully 6 in. across and 4 in. deep, solitary, terminal; sepals 3–5, purple outside; petals about 6: fr. 4–6 in. long. Himalayas. B.M. 7392.—The fls. have a spicy odor, hard thick fleshy texture, and the glaucous purplish blue of the sepals contrasts well with the ivory-white of the petals. Hooker ranks this species second in beauty only to *Magnolia Campbellii* (p. 1969, Vol. IV). *T. Hodgsonii* grows at an elevation of 5,000–6,000 ft. This fine tree has been flowered at Kew and perhaps elsewhere in Eu., but never in Amer., so far as is known. Many times seeds were received at Kew from India, but they never germinated, the reason being the rapid decay of the albumen, involving that of the embryo. The trees now cult. in Eu. have been derived from young plants sent from India in Wardian cases at considerable expense and risk. WILHELM MILLER.

TALÌNUM (possibly a native name in Senegal). *Portulacàceæ.* Fleshy herbs, sometimes becoming woody at the base with age, occasionally cult. in the warmhouse. Lvs. alternate or rather opposite, flat: fls. small, in terminal cymes, racemes, or panicles, rarely solitary, axillary, or lateral; sepals 2; petals 5, hypogynous, ephemeral; stamens 5 to many; ovary many-ovuled: caps. globose or ovoid, chartaceous, 3-valved.—About 15 species, widely scattered in the warmer regions.

The variety of *T. patens* is a handsome greenhouse shrub, with foliage marked white and sometimes also pink. The young stems are pink and succulent, but they become woody with age. The plant is allied to portulaca and will endure much heat and drought, but is very impatient of overwatering and lack of drainage. The plants bloom freely, the flowers being small, light pink, and followed by small yellow capsules filled with an indefinite number of little brown seeds. Some prefer to retain the sprays of blossom, but to make the best show of foliage the flower-shoots should be cut off as soon as they appear. Talinum is a satisfactory houseplant. It should be placed in a window with a northern exposure or in some other shady position. Talinum may also be planted out during the summer. (W. C. Steele.)

pàtens, Willd. Erect subshrub: st. almost simple, 1–2 ft. high, leafy to the middle, where the panicle begins: lvs. mostly opposite, oval, abruptly tapering at the base: panicle terminal, long, leafless, bearing dichotomous cymes: fls. carmine; petals 3 lines long; stamens about 15–20. W. Indies and east coast of S. Amer. to Buenos Ayres. Var. **variegàtum,** Hort. (*"Tolinium variegatum,"* Hort. *Basélla variegàta,* Hort.), is probably the plant described as sweet Malabar vine in Vol. I, page 455, of this work.

triangulàre, Willd. Lvs. alternate, obovate-lanceolate: cymes corymbiferous: pedicels 3-cornered (in *T. patens* they are filiform): fls. red or white. W. Indies, Brazil, Peru. Var. **crassifòlium,** Hort. (*T. crassifòlium,* Hort.), is said to be taller and more branched: lvs. larger, often emarginate and mucronate.
F. TRACY HUBBARD.†

TAMARACK: *Larix.*

TAMARÍNDUS (from the Arabic *tamar-Hindi,* meaning "Indian date"). *Leguminòsæ.* A tropical genus containing but one species, the well-known tamarind. It is considered to be indigenous to tropical Africa (the upper Nile region) and possibly southern Asia as well. It has long been cultivated throughout the tropics of both hemispheres, being grown both as an ornamental and for its acid fruits, which have many uses. The tamarind became known in Europe during the Middle Ages, doubtless through the Arabians. Until correctly described by Garcia d'Orta (1563) it was supposed by Europeans to be produced by an Indian palm (Dymock).

Leaves alternate, equally pinnate, the lfts. small, indefinite in number; stipules minute, caducous: fls. irregular, produced in racemes at the ends of the branches; bracts and bracteoles ovate-oblong, colored, caducous; calyx-tube turbinate, narrow, the segms. 4, imbricate, membranaceous, colored; 3 superior petals imbricate, yellowish, veined with red, 2 inferior reduced to bristles hidden at the base of the staminal tube; fertile stamens 3, connate in a sheath, opening above with short, free filaments, anthers oblong, longitudinally dehiscent; ovary many-ovuled, with a stalk adnate to the calyx-tube, the style filiform, stigma terminal, subcapitate: fr. an oblong or linear, compressed, indehiscent pod, with a thick, crustaceous epicarp, pulpy mesocarp, and coriaceous endocarp septate between the obovate-orbicular, compressed seeds; embryo exalbuminous. The genus is distinguished from Schotia, the only ally which seems to be cult. in Amer., by its floral characters.

indica, Linn. TAMARIND. TAMARINDO. Fig. 3768. A large tree, attaining to 80 ft. in height when grown on deep soils, with a trunk 25 ft. in circum.: bark brownish gray, somewhat shaggy: lvs. abruptly pin-

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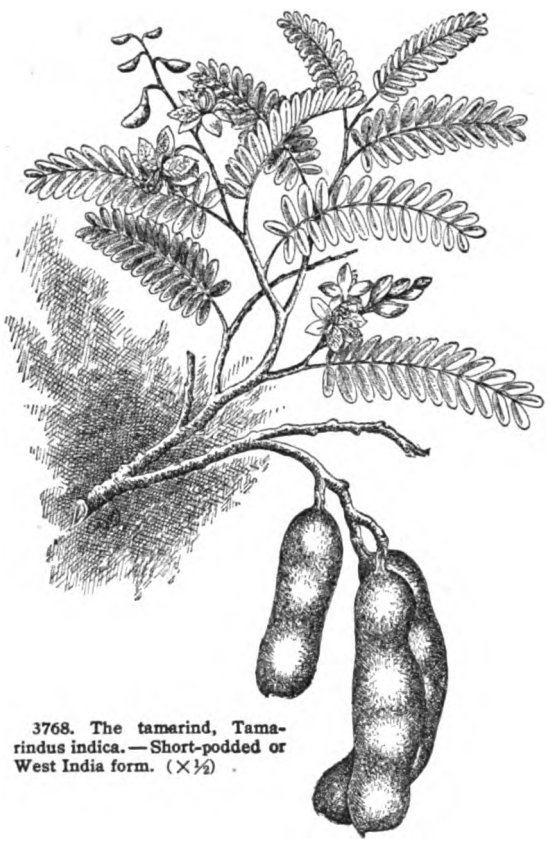
nate; lfts. 20–40, opposite, oblong, ½–¾in. long, glabrescent, soft, pale green, obtuse: fls. few together in lax racemes, individually about 1 in. broad, pale yellow, the petals veined red; calyx-teeth lanceolate, the lowest 2 connate: pod 3–8 in. long, ¾–1 in. broad, cinnamon-brown, with a brittle epicarp and brown pulp inclosing 1–12 seeds. Flowers in April and May in the northern hemisphere, ripening fr. in late autumn and winter. B.M. 4563 (as *T. officinalis*). J.F. 2:133.—The tamarind is a magnificent evergreen tree, extensively cult. in nearly all tropical countries. It succeeds in S. Fla., and has been grown as far north as Manatee, where a large specimen was killed by the freeze of 1884. It is not sufficiently hardy to be grown in Calif., failure having attended all past efforts to cult. it in that state, so far as known. It delights in a deep alluvial soil and abundant rainfall, the largest specimens being found in tropical regions where the soil is rich and deep. On the shallow soils of S. E. Fla. it does not attain to great size. When small it is very susceptible to frost, but when mature it will probably withstand temperatures as low as 28–30° F. without injury.



3768. The tamarind, Tamarindus indica.—Short-podded or West India form. (×½)

The plump slightly curved pod has a thin brittle shell. It contains a soft brownish pulp transversed by a few strong branched fibers; the large flattened glossy seeds, varying from one to twelve in number, are surrounded by a thin tough membrane. The pulp contains sugar together with acetic, tartaric and citric acids, the acids being combined, for the most part, with potash. In East Indian tamarinds, according to Dymock (Pharm. Ind. pt. II, 532–36) citric acid is present in a small quantity, about 4 per cent, while there is about 9 per cent of tartaric. The pulp is widely used in the Orient as an ingredient in chutnies and curries, and for pickling fish. In medicine, it is valued by the Hindus as a refrigerant, digestive, carminative, laxative, and antiscorbutic, for which latter purpose it is sometimes used in place of lime juice. With the addition of sugar and water, it makes a cooling drink or refresco, especially well known in Latin America. For the preparation of this drink, a sirup is often made from the pulp which can be bottled and used as desired. In some countries tamarinds are an important article of export. In Jamaica the fruit is prepared for shipment by stripping it of its outer shell, and then packing it in casks, with alternate layers of coarse sugar. When the cask is nearly full, boiling sirup is poured over all, after which the cask is headed up. In the Orient, the pulp, containing the seeds, is pressed into large cakes, which are packed for shipment in sacks made from palm leaves. This product is a familiar sight in the bazaars. It seems to be greatly esteemed as an article of diet by the Indians, as also by the Arabs, large quantities being shipped to Arabia from India.

According to Watt, the natives of India have an aversion to sleeping under the shade of the tree because of the supposed acid exhalation from the leaves. Pittier states, however, that he has slept under a tamarind tree for weeks without suffering the least inconvenience. Gamble writes that the leaves corrode the cloth of tents pitched in the shade of the tree. This happens, he says, in wet weather; the leaves fall on the tents, and within a day or two the cloth is decomposed in holes.

The tree is easily propagated by means of seeds, which is the only method commonly used. Seeds can be transported without difficulty, as they retain their viability for a considerable length of time if kept dry. They are best germinated by planting them ½ inch deep in light, sandy loam. The young plants are rather delicate and must be handled carefully to prevent damping-off. In India, the yield of a mature tree is said to be about 350 pounds of fruit per annum. Little is known of the insect pests which attack the tree; Maxwell-Lefroy mentions two, *Caryoborus gonagra*, a large gray-brown chrysomelid beetle found in tamarind seeds, and *Charaxes fabius*, a large black yellow-spotted butterfly whose larvæ feed on the leaves. Both these insects occur in India.

Firminger mentions three varieties of tamarind grown in India, but does not know whether they can be depended on to come true from seed. Masters, in the "Treasury of Botany," states that the East Indian variety has long pods, with six to twelve seeds, while the West Indian variety has shorter pods, containing one to four seeds. Seedlings undoubtedly show considerable variation in the size and quality of their fruit, which accounts for the different varieties which have been noted by many writers. Firminger recommends that seedlings which produce unusually choice fruit be propagated by gootee, or stem-layering, a method which is described under Litchi. More recently (1913) Wester has reported that the tree can be shield-budded successfully the method being similar to that used with avocado.

F. W. POPENOE.

TAMARISK: *Tamarix.*

TÁMARIX (ancient Latin name). *Tamaricàceæ.* TAMARISK. Ornamental woody plants, grown chiefly for their showy panicles or racemes of pink or whitish flowers; and also for their very fine graceful foliage.

Deciduous shrubs or trees: lvs. alternate, sessile, often sheathing, small, and scale-like: fls. small, short-pedicelled or sessile, in rather dense racemes, usually collected into terminal panicles; sepals and petals 4–5; stamens usually 4–5, rarely 8–12, sometimes slightly connate at the base; ovary 1-celled, surrounded at the base by a more or less deeply 5- or 10-lobed disk; styles 2–5, clavate or short and thick: fr. a caps., dehiscent into 3–5 valves; seeds many, minute, with a tuft of hairs at the apex.—About 75 species from the Medit. region to

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E. India and Japan. Several species have medicinal properties and yield dye-stuffs. The punctures of an insect, *Coccus manniparus*, cause *T. mannifera* to produce "manna."

The tamarisks are very graceful shrubs or small trees with slender branches clothed with minute scale-like appressed leaves, and with usually light pink small flowers in large and loose terminal panicles or in numerous lateral racemes, followed by small capsular fruits. None of the species is quite hardy North, but *T. pentandra*, *T. odessana*, *T. gallica*, and *T. parviflora* are fairly hardy as far north as Massachusetts. Several of the species bloom late in summer and are a welcome addition to the autumn-flowering shrubs. As they are inhabitants of warmer arid regions, they are adapted for dry-land conditions, and they also grow well in saline and alkaline soil. They are excellent for seaside planting and thrive in the very spray of the salt water. Propagation is by seeds, which are very fine and should be only slightly covered, or usually by cuttings of ripened wood in the open ground or by greenwood cuttings under glass.

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KEY TO THE SPECIES.

A. *Fls. 4-merous: racemes lateral on last year's branches.*
B. *Petals spreading, persistent; styles usually 3* ..... 1. **parviflora**
BB. *Petals erect, deciduous; styles usually 4* ..... 2. **tetrandra**
AA. *Fls. 5-merous.*
B. *Racemes lateral on last year's branches* ..... 3. **juniperina**
BB. *Racemes forming large terminal panicles, rarely lateral on the current year's branchlets.*
C. *Lvs. glabrous.*
D. *Petals persistent.*
E. *Bracts ovate-lanceolate* ..... 4. **pentandra**
EE. *Bracts subulate.*
F. *Infl. nodding: tree with spreading branches* ..... 5. **chinensis**
FF. *Infl. upright: erect shrub.* 6. **odessana**
DD. *Petals deciduous* ..... 7. **gallica**
CC. *Lvs. finely pubescent* ..... 8. **hispida**

1. parviflòra, DC. (*T. tetrándra* var. *parviflòra*, Boiss. & Kotschy). Fig. 3769. Shrub or small tree, 15 ft. high, with reddish brown bark and slender spreading branches: lvs. ovate, acuminate, semi-amplexicaul, scarious at the apex when older: fls. pink, very short-pedicelled, in slender racemes about 1 in. long along last year's branches; petals spreading, persistent; calyx very small, sometimes only 3-parted; styles usually 3, much shorter than ovary. April, May. S. Eu. F.S. 9:898. R.H. 1855:401. Gn. 61, p. 273; 71, p. 358. —Often confounded with the *T. tetrandra*, also with *T. africana* and *T. gallica* and cult. under these names. *T. tetrandra* var. *purpurea* probably belongs here.

2. tetrándra, Pall. Shrub or small tree, attaining 12 ft., with almost black bark: lvs. ovate-lanceolate, somewhat narrowed at the base, with diaphanous margin: fls. light pink or almost white, in racemes 1–2 in. long along last year's branches; disk purple, deeply 4-lobed; styles usually 4, about as long as ovary. April, May. S. E. Eu., W. Asia.—Doubtful whether in cult. in this country; all plants seen under this name by the writer belong to the preceding species.

3. junipérina, Bunge (*T. japónica* and *T. plumòsa*, Hort.). Shrub or small tree, attaining 15 ft., with slender spreading branches: lvs. green, obiong-lanceolate, acuminate, scarious at the apex: fls. pinkish, in lateral racemes 1½–2½ in. long on last year's branches; pedicels slender, shorter than calyx; sepals ovate-lanceolate, little shorter than the persistent petals; disk 5-lobed, with emarginate lobes. Japan, N. China. S.Z. 1:71 (as *T. chinensis*.)

4. pentándra, Pall. (*T. Pállasii*, Desv. *T. hispida æstivàlis*, Hort.). Shrub or small tree with usually purple branches: lvs. lanceolate to ovate, acute, glaucous or pale green: fls. pink, in large panicles, the racemes dense, 1–2 in. long; bracts ovate-lanceolate, acute or acuminate, as long or slightly longer than pedicels; petals broadly elliptic-oblong, connivent; disk 5-lobed, with emarginate lobes; styles 3, with obovate, connivent stigmas. Aug., Sept. S. E. Eu. to Cent. Asia. B.M. 8138. Gn. 77, p. 494. Gn. W. 25:121.—*T. amurénsis*, Hort., is a form of this variable species. F.E. 20:344, pl. 105. Also *T. cáspica* probably belongs here.

3769. Tamarix parviflora. (×½)

5. chinénsis, Lour. Shrub or small tree, attaining 15 ft., with slender spreading, often drooping branches: lvs. bluish green, lanceolate, acuminate, keeled: fls. pink, in large and loose usually nodding panicles, pedicels as long as calyx; sepals ovate, much shorter than the persistent petals; disk deeply 10-lobed. July–Sept. China.

6. odessàna, Stev. Shrub 4–6 ft. high, with upright, slender branches: lvs. lanceolate, subulate, decurrent: fls. pink; racemes slender, about 1 in. long, on short, naked peduncles, spreading and disposed in ample loose panicles; pedicels about as long as calyx; petals slightly spreading; disk 5-lobed, with rounded lobes. July–Sept. Caspian region.

7. gállica, Linn. (*T. arbòrea*, Sieber, not Ehrenb. *T. canariénsis*, Willd.). Shrub, or small tree with slender spreading branches: lvs. dull to bluish green, closely imbricated, rhombic-ovate, acute or acuminate, keeled, semi-amplexicaul, with scarious margin: fls. white or pinkish, globose in bud, almost sessile, in slender, panicled racemes; petals deciduous; filaments somewhat dilated at the base, inserted between the rounded lobes of the 10-lobed disk; styles 3. May–July. W. Eu., Medit. region to Himalayas; naturalized in S. Texas and N. Mex. Gn. 34, p. 329. Var. **índica,** Ehrenb. (*T. índica*, Willd.). With slender, upright branches: lvs. dull green: racemes longer and slenderer: fls. pink, disk obscurely and minutely 10-lobed. Himalayas. Var. **narbonnénsis,** Ehrenb. Racemes short, almost sessile, lateral on the current year's branches. S. W. Eu. Var. **élegans,** Schelle (*T. élegans*, Hort.), is a garden form of slenderer habit and with brighter green foliage; blooms somewhat later.

8. híspida, Willd. (*T. kashgárica*, Hort.). Shrub, with slender upright branches: lvs. bluish green, cordate and subauriculate at the base, acuminate, somewhat spreading, finely pubescent: fls. pink, almost sessile, in dense racemes 2–3 in. long, disposed in terminal panicles;

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petals deciduous, much longer than sepals; disk 5-lobed. Aug., Sept., R.H. 1894:352.

T. africàna, Poir. Allied to T. juniperina. Racemes 2–3 in. long: fls. very short-pedicelled; styles slenderer. Medit. region. Apparently not in cult.; the plant offered in trade under this name is usually T. parviflora.—*T. algèrica* or *T. algeriénsis*, Hort., is probably T. gallica; no species has been described under these names. The Algerian species are: T. gallica, Linn., T. brachystylis, Gay, T. bounopœa, Gay, T. africana, Poir., T. Balansæ, Gay, T. rubella, Battand., T. pauciovulata, Gay, and T. articulata, Vahl.—*T. ánglica*, Webb. Allied to T. gallica. Shrub, to 10 ft.: lvs. bluish green, somewhat constricted at the base: fls. ovate in bud; filaments filiform at the base, attached to the acute lobes of the 5-angled disk. W. Eu. S.E.B. 2:261.—*T. articulàta*, Vahl. Tree, attaining 30 ft., with slender, jointed branches: lvs. glaucous, minute, sheathing: fls. 5-merous, pink, sessile, in terminal panicles. W. Asia. Not hardy N.—*T. dahùrica*, Willd.=Myricaria dahurica.—*T. germánica*, Linn.=Myricaria germanica.—*T. rubélla*, Battand. Allied to T. parviflora. Tree or shrub with red erect branches: lvs. minute, imbricate: bracts ovate, acute, almost as long as calyx; calyx-segms. 4; petals 4, rose; stamens 4, with long filaments and dark purple anthers. Algeria.

ALFRED REHDER.

TAMÒNEA (native name). *Melastomàceæ*. This name was revived to cover the names Cyanophyllum, Miconia, and others (Krasser, in Engler & Prantl, Die Natürlichen Pflanzenfamilien, III. 7. 1898), but later (Nachtr. 1, p. 267) the name Miconia was restored. Miconia is also retained in the list of "nomina conservanda" of the International (Vienna) Congress. Our cross-reference from Cyanophyllum to Tamonea, therefore (Vol. II, p. 930), should be to Miconia. There is apparently only one plant commonly known in cult. as Cyanophyllum, and this is accounted for as *Miconia magnifica* on p. 2047, Vol. IV; and others are there described. Under these dispositions, therefore, the name Cyanophyllum is dropped.

TÀMUS (the old Latin name used by Pliny). Also spelled *Tamnus*. *Dioscoreàceæ*. Herbaceous perennials from a tuberous root: st. annual, twining: lvs. alternate, cordate, entire or 3-lobed: infl. axillary racemes; male often elongated, lax, with the fls. solitary along the rachis or disposed in lax few-fld. racemelets or cymules; female very short, few-fld., sometimes reduced to a sessile fascicle; fls. diœcious; male perianth urn-shaped-campanulate, deeply 5-cleft; stamens 6; female perianth-segms. 6, small, narrow, distinct; staminodes minute or none; ovary 3-celled: berry subglobose, succulent, indehiscent. About 2 species, 1 from Canary Isls., the other from Eu., N. Afr., and Temp. Asia. *T. commùnis*, Linn. BLACK BRYONY. Rootstock ovoid, black, fleshy: st. very long, twining, branched: lvs. 2–3 in. long, ovate-cordate, acuminate, obscurely laterally lobed: fls. yellowish green, small: berry red. May, June. Eu., N. Afr., and Temp. Asia.

TANACÈTUM (name of doubtful derivation). *Compósitæ*. Annual or perennial herbs which are odorous: lvs. alternate, variously cut: heads of small to medium-sized yellow fls. disposed in corymbs, or rarely solitary, heterogamous, disk-shaped; female fls. with 3–5-toothed, tubular corollas: achenes 5-ribbed or 3–5-angular, with a broad truncate summit, bearing a coroniform pappus or none.—Thirty-five species scattered about the northern hemisphere, of which about 7 are native to N. Amer. For cult., see *Tansy*.

vulgàre, Linn. (*Chrysánthemum vulgàre*, Bernh.). TANSY. Fig. 3770. St. robust, erect, 2–3 ft., leafy to the summit: lvs. pinnately divided into linear-lanceolate segms. which are serrate or pinnately cut: fl.-heads ¼–½in. across, numerous, in a dense flat-topped cyme. July–Sept. Eu. Adventive in the U. S. Var. **crispum**, DC., has the lvs. more cut and crisped.

T. adenánthum, Diels. Plant densely tufted, 6–12 in. high: lvs. finely divided, clothed with white silky hairs: fl.-heads about ¼in. across. W. China.—*T. quercifólium*, W. W. Smith. Lower lvs. 4–6 in. long: fl.-heads containing about 20 yellow florets. Yunnan.

F. W. BARCLAY.

TANAKÆA (named in honor of M. Tanaka). *Saxifragàceæ*. Herb probably hardy and perennial: plant diœcious, perhaps sometimes monœcious, stoloniferous; stolons slender, leafy and rooting: lvs. basal, long-petioled, thick or somewhat fleshy, finally leathery, including the petioles 4–8 in. long; blade oblong-lanceolate or ovate-lanceolate, rounded or somewhat cordate at base, acute, doubly serrate: scapes very slender, branched, pyramidal, 6–8 in. high: fls. very small, greenish white, shortly pedicelled, solitary in the axils of the bracts; sepals 5, almost free, oblong-lanceolate; petals none; stamens 10, alternate ones shorter; ovary glabrous, almost entirely free, 2-celled.—One species, Japan, T. radicans, Franch. & Sav. B.M. 7943. G. 35:373; 36:515.

TANGELO (from tangerine and pummelo; by syncopation: tange[rine] [pumme]lo). A new group of citrous fruits originated in 1897 by the writer by crossing the Dancy tangerine with the Bowen grapefruit.

3770. Tansy.—Tanacetum vulgare. (×⅓)

The resulting hybrid, named Sampson tangelo by H. J. Webber and the writer (United States Department of Agriculture Yearbook, 1904) does not closely resemble either parent in its fruit characters, being a slightly pear-shaped thin-skinned smooth and shining fruit of medium to large size, pale orange in color, and with a rather acid sprightly flavored very soft and juicy orange-colored pulp. It ripens very late, several months after it begins to color, and sometimes becomes partly dry before complete maturity. When properly grown it is a delicious fruit. It is being grown commercially on a small scale, but its delicate skin and liability to dry out before fully ripe probably will preclude its culture except by experts for a special market.

The Thornton is another tangelo, a hybrid of tangerine with a Florida grapefruit. It is a rough thick-skinned round fruit with very pale orange-colored juice and sprightly flavored pulp. It ripens earlier than the Sampson tangelo and is less acid. It is very like a tender good-flavored orange in character. It is beginning to be grown commercially on a small scale.

The success of the first two tangelos produced by artificial hybridization has led to the creation of hun-

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dreds of additional hybrids between all the mandarin types of orange (*Citrus nobilis*) such as the tangerine, willow-leaf mandarin, King, Satsuma, and the like, and the better sorts of grapefruit and pummelo (*Citrus grandis*). These fruits in general resemble round oranges (*Citrus sinensis*) more than either of their parents and are exceedingly variable, sister fruits from seeds of a single cross-pollinated fruit often being very unlike. Among the tangelos there are some of much promise because of their superior flavor and juiciness.

The spread of citrus canker (a bacterial disease caused by *Pseudomonas citri*) to many of the hot moist orange-growing regions of the world makes it desirable to breed new types of tangelos by hybridizing the canker-resistant mandarin oranges with canker-resistant pummelos such as can be found in the Orient. Such tangelos, if canker-resistant, could perhaps be grown in place of the more susceptible round oranges, just as limequats can be grown in place of the common lime, which is very susceptible to canker.

WALTER T. SWINGLE.

TANGERINE: *Orange* and *Citrus*.

TANSY (*Tanacetum vulgare*, Linn.). A coarse-growing herbaceous perennial naturalized from middle Europe, and a familiar occupant of old gardens, waste places, and roadsides. Its common name is said to be derived from *athanasia*, immortality, an idea suggested to the ancient Greeks by the characteristic permanent possession it takes of the soil. Its annual upright usually unbranched stems, which rise about 3 feet from the perennial root, bear greatly divided deeply cut compound bitter aromatic leaves and rather dense corymbs of numerous small yellow flower-heads which appear in midsummer. The seed, which is small, is marked by five rather prominent grayish ribs and retains its vitality for about two years. Formerly its leaves were in great favor as a seasoning for various culinary preparations, especially puddings and omelettes, uses now almost obsolete. By the medical profession, its tonic and stimulant properties and its efficacy in hysterical and dropsical disorders are still recognized, although other medicines are more popular. In domestic practice it played an early rôle as an anthelmintic and stomachic and is still somewhat popular as a local agent to relieve the pain of muscular rheumatism, bruises, and chronic ulcers. The wild plants usually satisfy all demands, but when no wild supply is at hand seed may be used to start the half-dozen specimens that a family should need. Easily started, readily transplanted or divided, tansy requires no special care in cultivation except to keep it clear of weeds and to prevent its spreading and thus becoming troublesome. It will thrive in almost all soils and situations that are not too wet. For botanical account, see *Tanacetum*.

3771. Small-leaved form of dandelion

3772. Large-leaved form of dandelion.

3773. Cut-leaved form of dandelion.

M. G. KAINS.

TAPEINÒTES (from the Greek, referring to its low stature). *Gesneriàceæ*. Under this generic name, one species is listed abroad, *T. Carolinæ*, Wawra. The genus is now included in Sinningia and the current name is *S. Carolinæ*, Benth. & Hook. (*S. barbàta*, Nichols.). It is a Brazilian plant, adapted to the warmhouse: decumbent or ascending, with oblong to lanceolate crenate-serrate lvs. 1 ft. or less long and red beneath: fls. white, red-marked inside, with a contracted and hairy throat and tube swollen at base. B.M. 5623, which represents a striking plant with lvs. brilliant red-purple beneath and curved hairy deflexed white corollas 1½ in. long: described as a small undershrub.

TAPIOCA: *Manihot*.

TAPIRÌRA (from a native name in Guiana). Also spelled *Tapìria*. *Anacardiàceæ*. A name of disputed application. The plant likely to interest horticulturists in this relationship is *Cyrtocarpa procera*, from Mex., described on p. 945, Vol. II. Of Tapirira itself, distinguished by 4–5 styles, those in the pistillate fls. short, none is probably regularly in cult. As formerly defined, the species are S. American, with a few in Afr. and Asia, 8 or 10 in number. Later authors restrict the genus to S. Amer., mostly to Brazil. Under any definition, the genus is probably adapted to cult. only on our southernmost borders.

TAPÍSCIA (anagram of Pistacia, to which it bears a strong resemblance, though not closely related).

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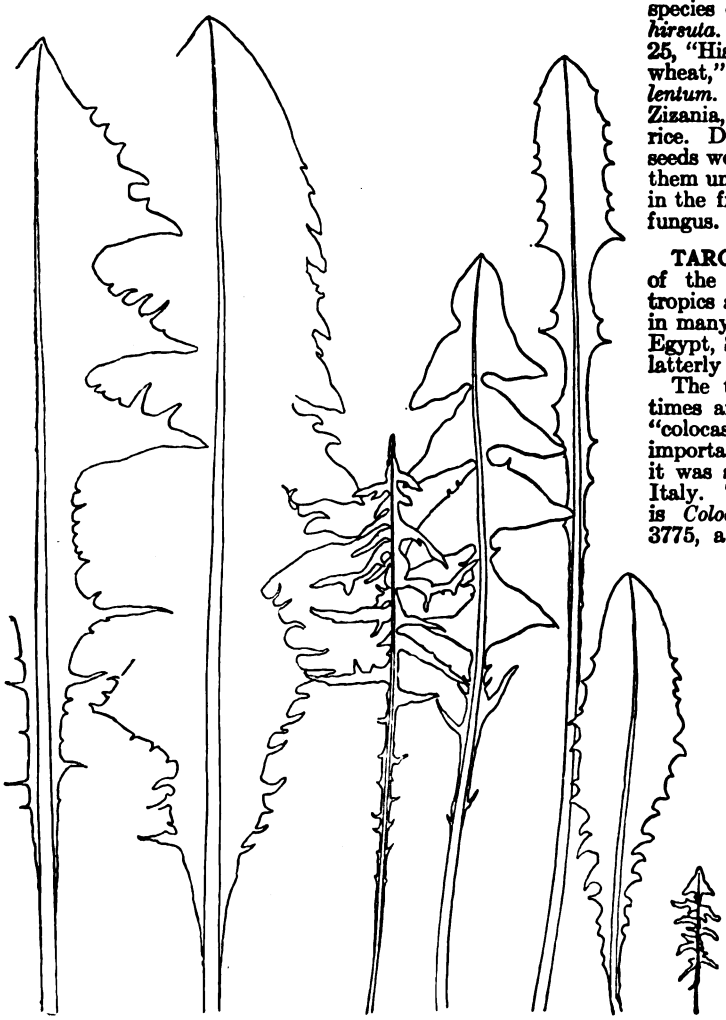
Staphyleàceæ. An ornamental deciduous tree from China with large alternate odd-pinnate lvs., deciduous stipules and with small yellow fragrant fls. in axillary panicles: calyx tubular-campanulate, 5-lobed; petals 5, spatulate-obovate, little longer than the calyx; stamens 5, exserted; style slender, longer than stamens; ovary superior: fr. a 1-seeded ovoid drupe. It is as yet little known in cult., but probably can be grown successfully in the S. only; it may be recommended chiefly for its bold pinnate foliage and the honey-scented fls. Prop. can probably be effected by cuttings besides by intro. seeds. **T. sinénsis,** Oliver. Small tree, to 30 ft., occasionally to 90 ft.: lfts. 5–7, ovate to ovate-oblong, acuminate, cordate at the base, serrulate, glaucescent and nearly glabrous beneath, 3–5 in. long: panicles broad, 2–3 in. long: fls. ½in. long, yellow, fragrant: fr. ovoid, black, ½in. long. June, July. Cent. and W. China. H.I. 20:1928. ALFRED REHDER.

TARÁXACUM (name probably associated with supposed medicinal properties). *Leontodon* of some authors. *Compósitæ*. DANDELION. Low nearly or quite stemless herbs of cold and temperate regions, mostly of the northern hemisphere. Distinguished by having large many-fld. ligulate yellow heads solitary on naked and hollow scapes; involucre with one inner series of erect narrow bracts and outer calyx-like spreading sometimes reflexed bracts; pappus simple and capillary, borne on a slender beak terminating a fusiform elongated angled achene: fls. opening in sunshine. The plants are exceedingly variable and there are consequently great differences of opinion as to the number of species. Bentham & Hooker would reduce them to about 6, and others would retain 25 or more. The common dandelion is **T. officinàle,** Weber, known also as *T. Dens-leònis,* Desf. It varies immensely in stature and form of lvs., as shown in Figs. 3771–3774. For history, see Sturtevant, Proc. 6th Meeting Soc. Prom. Agr. Sci., and Amer. Nat., Jan., 1886. For an account of the red-seeded dandelion, **T. erythrospérmum,** Andrz., see Fernald, Bot. Gaz., July, 1895:323. From the common dandelion it differs in having smaller sulfur-yellow heads, smaller and very deeply cut lvs., outer involucral scales not reflexed and somewhat glaucous: achenes red or red-brown and shorter beaked: pappus dirty white. It is known to occur in New England, N. Y., Pa. and W.; probably naturalized from Eu. For the cultural directions, see *Dandelion,* Vol. II.

L. H. B.



3774. Variation in foliage of the common dandelion.
(All leaves drawn to the same scale.)

TARE, TARES. To the modern English farmer the word "tare" means the common vetch, *Vicia sativa,* although tare is also applied loosely to other species of Vicia and Lathyrus, particularly *Vicia hirsuta.* The celebrated passage in Matthew xiii, 25, "His enemy came and sowed tares among the wheat," refers probably to the darnel, *Lolium temulentum.* The original Greek word in Matthew is Zizania, a name which in botany refers to the wild rice. Darnel belongs to the grass family and its seeds were long thought to stupefy those who ate them unwittingly. The supposed narcotic property in the fruit is said to be due to the presence of a fungus.

TARO. A group of tuberous-rooted edible aroids, of the genus Colocasia, scattered throughout the tropics and subtropics of the world; cultivated also in many warm regions of the temperate zones, as Egypt, Syria, China, Japan, and New Zealand, and latterly in the southern United States.

The taro has been cultivated from very early times and the Egyptian variety, under the name "colocasia," is mentioned by Pliny as being of great importance in Egypt at that time. The culture of it was said to have been already introduced into Italy. The Egyptian variety, now called qolqas, is *Colocasia antiquorum* (*Arum Colocasia*), Fig. 3775, a quite different plant from that of the varieties most commonly grown in southeastern Asia and the islands of the Pacific. The qolqas is of very inferior quality and is said to be eaten in Egypt only by the laboring classes.

The botany of the taros of the Pacific regions is in an unsatisfactory state, owing largely to the infrequency with which many varieties flower, but most of them evidently belong to *Colocasia esculenta* (by some considered to be a variety of *C. antiquorum* and so treated in Vol. II, page 830). See Fig. 3776.

The culture of taro has probably reached its highest development in the Hawaiian Islands and it is largely through its extensive use there that the plant has become so widely known among travelers and others. The large number of varieties despite the fact that the plants seldom, if ever, set seed, testifies to the antiquity of the culture of this type of taro. MacCaughey and Emerson, in the Hawaiian Forester and Agriculturist

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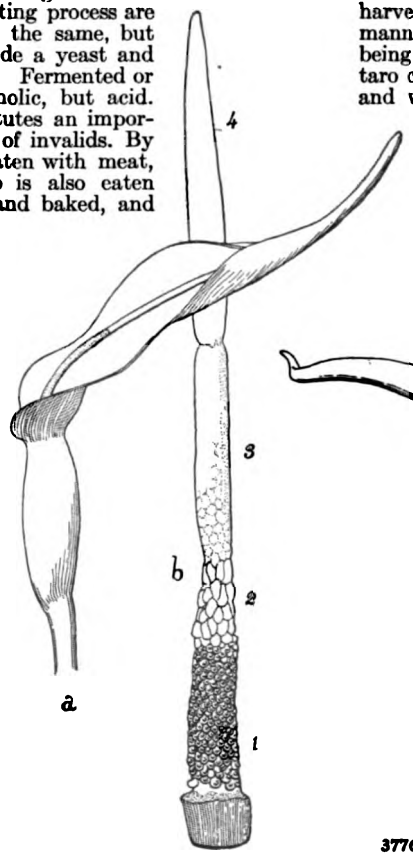
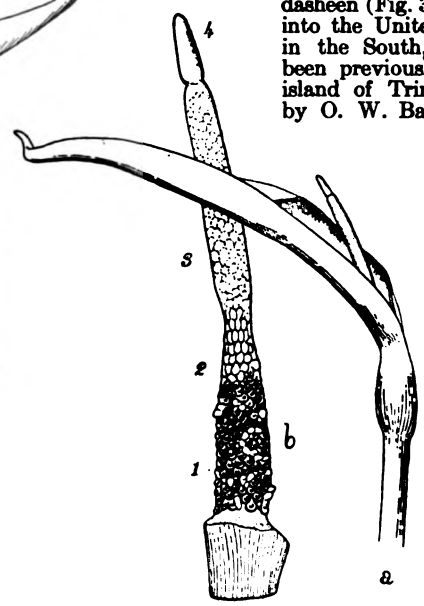
(vols. 10, 11, 1913–1914), record a list of 262 named varieties of taro, or "kalo," which are said to have been grown on the islands. But few of these are of commercial importance, and many are no doubt lost.

In Hawaii, taro is eaten mostly in the form of poi, a sticky paste made by steaming or boiling the taro, then peeling and "pounding" or grinding it with the addition of a little water. It is usually allowed to ferment for a day or two before being eaten, and is considered to be a very easily digested, wholesome, and nutritious food. The organisms involved in the fermenting process are probably not always the same, but they appear to include a yeast and one or more bacteria. Fermented or sour poi is not alcoholic, but acid. Poi frequently constitutes an important part of the diet of invalids. By others it is usually eaten with meat, especially fish. Taro is also eaten boiled, or parboiled and baked, and in many other ways like the potato. Most varieties are acrid in the raw state, however, and these often require longer cooking in order to destroy this property. When properly cooked and served, the better varieties of taro are highly palatable and constitute a most valuable food. The young leaves, before they open, are prized as greens and are called "luau." They are parboiled with baking soda or cooked with fat meat to destroy the acridity.

The cultivation and use of taro in Hawaii appears to be slowly decreasing, although in 1913 it was estimated that the total planting was somewhat greater than 1,500 acres. It is reckoned as fourth in importance among the crops cultivated, sugar-cane, rice, and pine-apple exceeding it.



3775. Taro — Colocasia antiquorum. *a*, Inflorescence, showing wide-open limb of spathe and long sterile appendage of spadix characteristic of this species. *b*, Spadix, showing the following areas, beginning above the base: *1*, pistillate flowers; *2*, abortive flowers which were compressed by the neck of tube of spathe; *3*, staminate flowers; *4*, sterile appendage.



3776 Taro — Colocasia esculenta (C. antiquorum var. esculenta). *a*, Inflorescence, showing limb of spathe open to trough-shape and short sterile appendage characteristic of this species. *b*, Spadix, showing the following areas, beginning above the base: *1*, pistillate flowers; *2*, abortive flowers which were compressed by the neck of tube of spathe; *3*, staminate flowers; *4*, sterile appendage.

Taro-culture is of two general types, water and upland, and a different set of varieties is grown for each. The length of season required to grow a crop is about one year, although some varieties require longer and some mature in less time. Propagation is by a "huli," which consists of the top of a corm or cormel with 7 or 8 inches of the inner petioles still attached. Planting is undertaken at any time of the year.

In water culture the hulis are placed rather close together, often no more than a square foot being allowed for each plant. The cultural treatment varies greatly and is doubtless influenced by the water-supply, water being often scarce. The soil is puddled in order to prevent too rapid seepage. In some cases the land is rested for several weeks between crops, but more often replanting is made at once. Again, water is sometimes withheld for two to four weeks after planting, while at others the ground is not allowed to dry. At harvest-time the laborers wade into the mud and water and pull up the taro plants by the roots. The roots are then removed from the corms, the outer leaves stripped off, and hulis made from the tops as already described.

The practice in growing upland taro in Hawaii also varies considerably in the spacing of the plants, they being sometimes planted in small groups, at regular intervals, though more commonly in regular rows. The harvesting is performed by hand in much the same manner as described for water taro, a simple tool being used, however, in lifting the plants. Upland taro can be grown only where the rainfall is abundant and well distributed throughout the year, hence its culture is limited to certain localities.

The dasheen.

A variety of this same species of taro, *Colocasia esculenta*, known as the Trinidad dasheen (Fig. 3777), was introduced into the United States for culture in the South, in 1905, it having been previously brought from the island of Trinidad to Porto Rico by O. W. Barrett. This variety, which has come to be known simply as "dasheen," is thought to have come originally from China, as its name, a corruption from "de la Chine" or "da Chine," indicates. Varieties similar in appearance but inferior in quality exist, some of them known to be of Chinese origin.

The Trinidad dasheen is considered to be one of the most promising crop plants introduced into the United States in recent years, as it is thoroughly adapted for culture in the moist sandy loams of the South Atlantic and Gulf states and, as grown in such soils, is of excellent quality. The crop from each hill when well grown, consists of one or more large central corms, with a large number of lateral cormels or "tubers" (Fig. 3778). The total yield from one hill in good soil ranges from four pounds to as high as thirty pounds in rare cases. These are cooked for table use like potatoes. They are somewhat drier and have a delicate nutty flavor when they have been grown under suitable conditions and are properly prepared. The color of cooked dasheens varies from white or cream to gray or violet. When grown in heavy or poorly drained lands, however, the quality is usually inferior, in both texture and flavor.

An average of eleven analyses of the dasheen gives 27⅔ per cent of starch and sugars and 3 per cent of protein. The sugar-content is a little higher than in

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the white potato, making the dasheen seem slightly sweet by comparison. Like other taros, it is held by many to be easy of digestion as compared with most other starchy foods.

In the United States, the dasheen is at present grown exclusively as an upland crop, that is, not under flooded conditions as other taros are usually grown in Hawaii. The crop requires about seven months of warm frostless weather fully to mature. It has been grown with best results in a moist but well-drained rich sandy loam. Heavy soils produce a low quality of corm and tuber, and often a poor yield. Muck soils, if they contain a moderate amount of moisture, usually produce a heavy crop of dasheens but of poor quality for table use. Dry soils of any kind are useless for dasheens.

Planting should be made in the early spring, just so that the last spring frost will be past before the plants are up. In central Florida, it is made about the middle of March and farther north, up to early April. Cormels, or "tubers," two to four ounces in weight, are generally used for planting, although smaller ones may be used. Larger tubers, small corms, or the upper parts of larger corms may also be planted when available. The character of soil is of greater importance than the size of tuber planted. The tuber is planted about 2 inches below the surface. The plants are spaced 4 by 3 or 3½ by 3½ feet, on level ground except where there is danger from standing water, when planting should be done on ridges. With level planting the soil is gradually drawn toward the plants in cultivating during the latter half of the season. The large leaves shade the ground almost completely by midseason if the soil conditions are good.

The crop matures in late October and early November in the southern United States. Harvesting is performed with a spade or with team and plow. Dasheens keep well when properly handled and stored. The entire subject is treated at length in bulletins of the United States Department of Agriculture.

ROBERT A. YOUNG.

TARRAGON (*Artemisia Dracunculus*, which see) is a close relative of wormwood (*A. Absinthium*). It is a perennial composite herb native of the Caspian Sea region and Siberia, and is cultivated as a culinary herb in western Europe. Its lanceolate entire leaves and small inconspicuous and generally sterile blossoms are borne upon numerous branching stems, 2 to 3 feet tall. Its green parts, which possess a delicate aromatic flavor resembling anise, are widely used for seasoning salads and for flavoring vinegar, pickles, and mustard. The essential oil of tarragon and tarragon vinegar are articles of commerce, the crop being grown extensively in southern France for this purpose. The former is obtained by distillation of the green parts, the latter by simple infusion in vinegar. The best time to gather the crop for distillation or infusion is when the first flowers begin to open, since the plants have then a larger percentage of oil than before or after. From 300 to 500 pounds of green parts, according to seasonal and other conditions, are needed to produce one pound of oil.

3777. Full-grown plant of dasheen, the variety of taro grown in the United States.

3778. A hill of dasheen. The large central corm, with part of leaf-stems still attached, is surrounded by the cormels, or tubers, just as they grow.

As cultivated tarragon rarely produces viable seed, the plant is propagated by cuttings of both old and green wood and by division of the roots. Cuttings may be taken at any convenient time, but the best time for the division is when the plants have just begun to grow in the spring. Tenacious and wet soils should be avoided and only loams of medium texture and of poor quality in sunny situations chosen. The plants may be set, either in the spring or in the autumn, 1 foot apart and cultivated like sage or mint. The flower-stems should be removed as soon as seen, as this will force greater growth of leaves. The green parts may be gathered at any time, after the plants have become established, and used fresh. Dried tarragon is nearly as useful as green, but there is little market for it, less even than for the leaves. At the approach of winter, especially in cold and snowless climates, the stems should be cut down and the plants covered with litter or leaves. The position of the beds should be changed every three or four years. Tarragon is less cultivated in America than it deserves. Most of our tarragon vinegar comes from France.

A wholly different plant, *Tagetes lucida*, is much like tarragon in flavor and has been used as a substitute for it.

M. G. KAINS.

TASMÁNNIA (named after Abel Jansen Tasman, navigator, for whom the island Tasmania is named). Now considered a synonym of *Drimys*. One species, *Drimys aromática*, Muell. (*Tasmánnia aromática*, R.Br.), is sometimes mentioned in horticultural literature: small tree or a bushy shrub with pinkish fls., elliptic-oblong or oblong-lanceolate lvs. and aromatic pea-size berries. Victoria, Tasmania. B.R. 31:43.

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TAVARÈSIA (derivation unexplained). *Asclepiadàceæ*. Succulent stapelia-like perennials, branching at the base: sts. 6–12-angled, angles tuberculate, toothed, each tubercle with 3 bristles: fls. large and showy, in sessile cymes at base of young sts.; calyx 5-parted; corolla large, tubular-funnel-shaped, 5-lobed; crown double, outer shortly tubular at base, then divided into 10 long filiform segms., each terminated by a knob, inner crown of 5 narrow lobes; staminal column arising from base of corolla. Two species, Trop. and S. Afr. *T. Bárklyi*, N. E. Br. Glabrous: sts. 3–4 in. high, thick, fleshy, cylindrical, 10–12-angled, tubercles white-bristled: cymes sessile, few-fld.: corolla smooth, pale greenish or greenish white spotted with purple-red outside, inside papillate, pale yellowish, covered with small purple-red spots, base entirely purple-red; knobs of the filiform outer crown-segms. globular. Trop. and S. Afr. B.M. 6203. G.C. III. 27:210 (both as *Decabelone Barklyi*). G.W. 15, p. 117.

3779. Taxodium distichum.—Bald cypress.

TAXÒDIUM (alluding to the similarity of the foliage to that of Taxus). Syn., *Glyptostròbus*, *Schubértia*. *Pinàceæ*. Ornamental woody plants, grown chiefly for their graceful feathery foliage.

Deciduous or evergreen trees or shrubs: lvs. alternate, linear, usually 2-ranked, falling off in autumn or the second year together with the short lateral branchlets: fls. monœcious, small; staminate fls. catkin-like, consisting of spirally arranged anthers, with 4–9 anther-cells and forming terminal panicles; pistillate fls. solitary or in pairs at the ends of branchlets of the previous year, composed of imbricated scales bearing 2 ovules inside at the base: cone globose or nearly so, maturing the first year, consisting of spirally arranged woody scales enlarged at the apex into an irregularly 4-sided disk with a mucro in the middle and toward the base narrowed into a slender stalk; 2 triangular, winged seeds under each scale; cotyledons 4–9.—Two species in N. Amer. and 1 in China.

Of the three species, the only one well known in cultivation is the bald cypress, *T. distichum*, a tall pyramidal deciduous tree with small linear two-ranked leaves and small globose cones. It is hardy as far north as New England and is a very desirable tree for park planting. Its light green feathery foliage and the narrow pyramidal habit which it usually retains in cultivation give it a very distinct appearance. In its native habitat it forms in old age a broad round-topped head sometimes 100 feet across and has the trunk much enlarged at the base by huge often hollow buttresses projecting in all directions and terminating in long horizontal roots. From these roots spring the peculiar cypress knees, pyramidal protuberances composed of a very light, soft, spongy wood and spongy bark. These sometimes attain a height of 10 feet and with age usually become hollow. From the under side of the horizontal roots large anchor-roots are sent perpendicularly into the earth and help to anchor the tree firmly in the swampy yielding soil. The knees are thought by some to be formed for the purpose of strengthening this root-system, since they are chiefly found opposite to the anchor-roots, but their main purpose is probably to bring air to the roots during the several weeks or months when the swamps are covered with water. The knees always grow high enough to rise above the surface of the water (see, also, G. F. 3, pp. 2, 21, 22, 57). The bald cypress is one of the most valuable timber trees of North America. The wood is brown, light and soft, close and straight-grained, but not strong; it is easily worked, durable in the soil and much used for construction. The bald cypress thrives best in moist sandy soil, but also does well in drier situations. The habit seems to depend somewhat on the degree of moisture; in drier soil the head is more narrow-pyramidal, in moist soil broader and more spreading. Propagated by seeds sown in spring and the varieties by grafting on seedling stock early in spring in the greenhouse; also by cuttings in sand constantly saturated with water or grown in water alone, under glass.

dístichum, Rich. (*Cupréssus dísticha*, Linn. *Schubértia dísticha*, Mirbel). Bald Cypress. Deciduous Cypress. Fig. 3779. Tall deciduous tree, becoming 150 feet high, with a buttressed trunk usually 4–5, but sometimes attaining 12 ft. or more in diam., usually hollow in old age; bark light cinnamon-brown, flaky: branches erect or spreading, distichously ramified, forming a narrow pyramidal head, becoming at maturity broad and rounded, with slightly pendulous branches: lvs. narrowly linear, acute, thin, light green, ½–¾in. long: panicles of the purplish staminate fls. 4–5 in. long: cone almost globose, rugose, about 1 in. across and destitute of mucros at maturity, seed ¼in. long. March–May. Del. to Fla., west to Mo. and Texas, in swamps, along the larger rivers and over calcareous rocks. S.S. 10:537. G.F. 3:7; 10:125. G.C. II. 11:372; 18:361; III. 7:325, 328; 14:659; 24:320; 54:251. Gn. 76, p. 562. F.S.R. 2, p. 163. Gn.M. 2:11. F.E. 27:71. Gng. 2:225; 5:1. G.M. 39:875. M.D.G. 1896:303. S.H. 2:541. G.W. 14, p. 512.—An interesting natural variety is: Var. **imbricàrium,** Nutt. (*T. adscéndens*, Brongn. *T. microphýllum*, Brongn. *T. dístichum* var. *eréctifrons*, Schelle). Smaller tree with deeply furrowed bark: branches upright: lvs. subulate, ⅛–½in. long, more or less upright and rather appressed. Va. to Fla. and Ala., in lakes, ponds, small rivers, apparently always over a clay subsoil. B.M. 5603. F. 1871, p. 60. Var. **péndulum,** Carr. (*T. dístichum sinénse péndulum*, Loud. *Glyptostròbus péndulus*, Endl. *G. sinénsis*, Hort.). A form of the preceding variety with pendulous branches. Var. **pyramidàtum,** Carr. Narrow pyramidal form with short ascending branches. Var. **fastigiàtum,** Knight. With slender, upright, virgate branches sparingly ramified. Var. **nànum,** Carr. Dwarf, shrubby form, with numerous short branches. Var. **nùtans,** Ait. Branches spreading, long and slender, nodding at the tips. F.E. 29:9 (as *T. distichum pendulum*). Var. **microphýllum,** Carr. Shrub, with short spreading branches; the lateral

3780. Old English yews that have reached maturity.—Taxus baccata. Addison's walk, at Glasnevin, Ireland.

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branchlets with typical foliage, those of the longer branches gradually passing toward the end into small, scale-like, imbricate lvs.

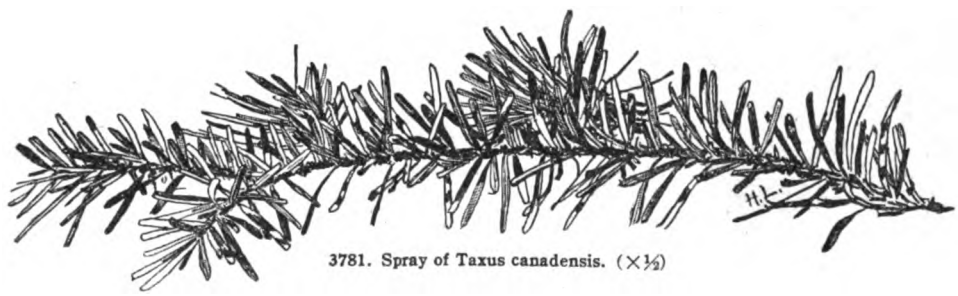
mucronàtum, Ten. (*T. mexicànum,* Carr. *T. distichum* var. *mexicànum,* Gord. *T. distichum* var. *mucronàtum,* Henry). MONTEZUMA CYPRESS. Similar to the preceding species: taller evergreen tree, occasionally 170 ft. high with a trunk 20 ft. or more in diam.: lvs. shorter, obtusish and mucronulate, falling with the branchlet the second year: staminate fls. and cones larger. Mex. G.F. 3:155. G.C. III. 12:647.—Sometimes planted in S. Calif.

T. heterophýllum, Brongn. (Glyptostrobus heterophyllus, Endl.). Shrub, 10 ft. high: lower branches pendulous: lvs. linear and scale-like on the same plant: cones ovoid, ¼in. long. China. Tender and rarely cult. Often confounded with varieties of T. distichum.

ALFRED REHDER.

TÁXUS (ancient Latin name of the yew). *Taxàceæ,* formerly named in the *Coniferæ.* YEW. Ornamental woody plants, grown for their dark green foliage and the scarlet berry-like fruits.

Evergreen trees or shrubs: lvs. linear, without resin-ducts, pale or yellowish green beneath, usually 2-ranked: fls. usually dicœcious, solitary and axillary, rarely terminal, small, appearing in early spring; staminate globose, composed of 4–8 stamens each, with 3–8 anther-cells attached to the peltate connective; pistillate consisting of a single terminal ovule with several bracts at the base: seed a bony nut surrounded



3781. Spray of Taxus canadensis. (×½)

or almost inclosed by a fleshy cup-shaped scarlet disk; cotyledons 2.—Six species are known. They are distributed throughout the northern hemisphere and in Amer. south to Mex. They are all very closely allied and have been considered geographical varieties of a single species. The wood is heavy, hard, close-grained, strong, elastic, and of reddish color. It is highly valued for cabinet-making and turning, and before the invention of gunpowder was in great request in England for the manufacture of bows. The foliage is poisonous to horses and cattle, but the berries are not.

The yews are evergreen, usually small slow-growing trees or shrubs, with 2-ranked linear dark green leaves, insignificant flowers and showy berry-like red fruits. The best-known species is *T. baccata,* which is hardy as far north as Rhode Island and northwestern New York, and in some forms as far as Massachusetts, while *T. cuspidata* and *T. canadensis* are considerably hardier and thrive as far north as Canada; the other species are little known in cultivation. The yews are very desirable evergreens for park planting; they are densely clothed with dark green foliage and the pistillate plants are particularly beautiful in autumn when loaded with scarlet fruits. They are well suited for hedges and easily trimmed into any desired shape. They were formerly much used for fantastic topiary work (see e. g., G.C. II. 2:264, 265).

That the typical tree-like form of the yew is nowadays not much planted is chiefly due to its slow growth, but the numerous mostly shrubby garden forms are popular plants for small gardens. The yews thrive best in a moderately moist sandy loam and endure shade well. Large plants may be successfully transplanted if it is possible to secure a sufficient ball of earth with the roots. Propagation is by seeds, which do not germinate until the second year, and by cuttings taken early in autumn and kept during the winter in a cool greenhouse or frame; the varieties also often by grafting on the type in early spring in the greenhouse, or sometimes by layers. Plants raised from cuttings grow more slowly than grafted ones and cuttings of the type rarely grow into trees but usually into low-spreading shrubs (see M.D.G. 1898:565).

baccàta, Linn. Fig. 3780. Tree, attaining 60 ft., with a usually short trunk, occasionally 8 ft. or more in diam.: bark reddish, flaky, deeply fissured in old trees: branches spreading, forming a broad, low head; branchlets somewhat pendulous: lvs. 2-ranked, linear and usually falcate, shortly acuminate, with prominent midrib, dark green above, pale beneath, ¾–1¼ in. long or shorter in some varieties: fr. ⅛–½in. across, with almost globose disk, about a third longer than the broadly ellipsoid brown seed ¼in. long. Eu. and N. Afr. to Himalayas. G.C. II. 23:309; III. 29:262. Gn. 27, p. 578; 35, pp. 36, 37. G.F. 9:265. F.S.R. 3, p. 59. G.W. 10, p. 249; 11, p. 304; 13, pp. 67, 175. Gng. 1:309.—Many garden forms have originated in cult.; the following are the most important: Var. **adprèssa,** Carr. (*T. parvifòlia,* Wender. *T. brevifòlia,* Hort., not Nutt. *T. tardìva,* Laws. *T. baccàta tardìva,* Pilger). Shrub or low tree of irregular habit, with long spreading branches: lvs. oblong, obtusish, mucronulate, ⅓–½in. long: disk of fr. shorter than the seed. R.H. 1886, p. 104. Gn. 35, p. 37. Very distinct form. Var. **adprèssa erécta,** Nichols. (var. *adprèssa stricta,* Beissn.), has the foliage of the preceding, but erect branches forming a columnar bush. Var. **aùrea,** Carr. (var. *elvastonénsis aùrea,* Beissn.). Lvs. golden yellow, more brightly colored at the tips and margin. This form has proved hardier than the type in New England. F.E. 20:703. Var. **argéntea,** Loud. (var. *elegantíssima,* Hort.). Lvs. striped straw-yellow or sometimes whitish. Var. **Dovástonii,** Loud. Branches wide-spreading, nodding at the tips: lvs. dull green, short and abruptly mucronulate. G. 3:89. A very handsome form. Var. **Dovástonii aùreo-variegàta,** Beissn., is a form with the lvs. variegated with yellow. Var. **erécta,** Loud. (var. *stricta,* Hort.). Bushy form, with slender, upright branches and branchlets: lvs. narrower and smaller than in the type. Var. **ericoìdes,** Carr. (var. *microphýlla,* Hort.). Dwarf form, with slender branches and small and very narrow, pointed leaves. Var. **fastigiàta,** Loud. (*T. hibérnica,* Hort.). Strictly fastigiate form, with stout crowded upright branches and branchlets: lvs. spirally arranged around the branches, dark glossy green. Gn. 35, p. 36; 40, p. 62. R.H. 1886:105. G. 2:85. F.E. 18:397; 33:315. G.W. 1, p. 349; 8, p. 301; 10, p. 393. One of the most desirable evergreens of columnar habit for formal gardens. Var. **fastigiàta variegàta,** Carr. Less vigorous and more tender: lvs. marked yellowish white. Var. **fastigiàta aùrea,** Standish. Young growth golden yellow. Var. **Fisheri,** Hort. Some of the lvs. deep yellow, others

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green. Var. **glaûca,** Carr. Vigorous form, with longer and narrower lvs. dark green above and with a glaucous bluish tint beneath. Var. **Jácksonii,** Gord. (var. *péndula,* Hort.). Branches spreading, pendulous at the tips, with more or less incurved lvs. Var. **lûteo-baccàta,** Pilger (var. *frúctu lúteo,* Loud.). With yellow fr. Gn. 35, p. 37. R.H. 1886, p. 104. Var. **procúmbens,** Loud. Prostrate shrub, with elongated and much ramified branches. Var. **repándens,** Hort. A low form with long wide-spreading branches and dull bluish green lvs. Var. **Wáshingtonii,** Beissn. Vigorous form, with longer lvs., partly colored golden yellow.

cuspidàta, Sieb. & Zucc. (*T. baccàta* var. *cuspidàta,* Carr.). Tree, attaining 50 ft., with a trunk usually 2 ft. diam.: bark bright red: branches ascending: lvs. usually falcate, thickish, distinctly and abruptly mucronate, dark green above, pale fulvous green or pale green beneath, ½–1 in. long: fr. with ovoid seed slightly 3–4-angled and ⅓in. long. Japan. S.I.F. 1:15. Very similar to *T. baccata,* but branches stouter and lvs.

3782. Taxus brevifolia. (×⅙)

darker green above and tinged yellowish beneath, somewhat broader, more abruptly mucronate and thicker in texture. Var. **nàna,** Rehd. (var. *brevifòlia,* Hort. Amer. Var. *compácta,* Bean). Shrubby form with spreading branches densely clothed with short branchlets: lvs. somewhat shorter and duller, ascending and not or scarcely 2-ranked: slow-growing, rather compact while young, but with age becoming more open. C.L.A. 11:308. F.E. 29:409. Gn.M. 2:11. Var. **dénsa,** Rehd. Low form making a dense sometimes almost hemispherical bush with ascending branchlets: lvs. like those of the preceding form. Var. **chinénsis,** Rehd. & Wilson (*T. baccàta* var. *chinénsis,* Pilger). Lvs. more falcate, lighter green, ¾–1¾ in. long, convex above with the midrib very slightly raised: seeds broadly ovoid, slightly compressed, slightly 2-angled. Cent. and W. China.—This variety fruits very profusely. The plant offered as var. *capitata* does not differ from typical *T. cuspidata.*

canadénsis, Marsh. (*T. baccàta* var. *mìnor,* Michx. *T. baccàta* var. *canadénsis,* Gray. *T. mìnor,* Brit.). Fig. 3781. Prostrate shrub, with wide-spreading slender branches, rarely more than 3 ft. high: lvs. shorter and narrower, less crowded and of a lighter, more yellowish green than those of *T. baccata,* assuming in winter usually a reddish tint: fr. ripens about 2 months earlier than that of *T. baccata;* seeds depressed, broader than long: fls. monœcious (at least usually). Newfoundland to Man., south to Va. and Iowa. B.B. (ed. 2) 1:67. V. 14:252. Gn.M. 2:22.—In cult. it becomes usually a more upright and less straggling shrub.

brevifòlia, Nutt. Fig. 3782 (adapted from Pacific R. R. Report). Tree, 40–50 or occasionally 80 ft. high, with slender horizontal or somewhat pendulous branches forming a broad, open, pyramidal head: lvs. distinctly 2-ranked, sharply pointed, dark yellowish green, ½–¾in. long: seeds ovoid, 2–4-angled. Brit. Col. to Calif. S.S. 10:514.—Probably as hardy as *T. baccata.*

T. floridàna, Chapm. Bushy tree, 25 ft. high or sometimes shrubby: lvs. slender, ¼–1 in. long, dark green. Fla. S.S. 10:515. —*T. koraiénsis,* Hort.=Cephalotaxus Harringtonia var. fastigiata. —*T. Wallichiàna,* Zucc. Tree, to 100 ft.: lvs. gradually long-acuminate, 1–1½ in. long. Himalayas, Malay Archipelago, Philippine Isls. Apparently not in cult.

ALFRED REHDER.

TCHIHATCHÈWIA (named for Count Paul Tchihatchef). *Cruciferæ.* Hardy perennial herb (possibly of shorter duration), suitable for the rockery. Plant very hispid: root thick: st. stout, leafy, pilose: fls. purple; sepals erect, the lateral ones saccate at base; petals clawed, blade minute; stamens without teeth: silique pendulous, obovate, compressed, broadly membranaceous-marginate, 1-celled, 2-seeded.—One species, Armenia. Sometimes spelled with another c, Tchichatchewia.

isatídea, Boiss. St. very stout, 6–10 in. high: lvs. 1½–2½ in. long, spreading and recurved, the upper ones gradually larger, sessile, linear, hispidly hairy: fls. bright rosy red, vanilla-scented, disposed in a dense, hemispherical, much-branched corymb, 4 in. across. Armenia. B.M. 7608. G.C. III. 42:324. R.H. 1895, p. 352.

TEA: *Thea.* **T., Oswego:** *Monarda didyma.* **T., Paraguay:** *Ilex paraguariensis.*

TEAK: *Tectona.*

TEASEL: Species of *Dipsacus.*

TÉCOMA (abridged from the Mexican name Tecomaxochitl). Including *Stenolòbium. Bignoniàceæ.* Ornamental shrubs, grown for their showy flowers.

Upright plants with herbaceous shoots: lvs. opposite, odd-pinnate, rarely simple; lfts. serrate, membranous: fls. in terminal panicles or racemes; calyx tubular-campanulate; corolla funnelform or funnelform-campanulate; stamens included, with diverging anther-cells and enlarged foliaceous connective; disk cupulate, crenate: caps. linear, with leathery valves; seeds narrow-elliptic, with 2 large thin wings.—About 5 species from Fla. and Texas to Argentina. The trumpet-vine, commonly referred to Tecoma, will now be found under Campsis.

The tecomas are upright shrubs with pinnate deciduous or subpersistent foliage and large and showy usually yellow flowers in terminal clusters. They stand but little frost and are well suited for cultivation in Florida and southern California. Propagation is by seeds which are usually freely produced and by greenwood cuttings under glass.

The yellow elder, *T. stans,* grows exceedingly well on high pine-land and is perfectly at home in Florida, attaining an immense size if well fertilized and mulched, dense masses 18 to 25 feet high and as much through being not at all rare. This tecoma is the glory of the south Florida gardens in autumn, as is the beautiful *Bauhinia purpurea* in April. No shrub is better adapted for the new settlers in the sandy pine-land gardens. When covered with its large fragrant flowers it is visited by numberless hummingbirds and insects. Owing to its rapid growth and dense foliage from the ground, the yellow elder is highly valued as screen for

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unsightly fences and buildings. This tecoma ripens its seed so abundantly that hundreds of seedlings come up around the old plant. The value of this shrub, blooming so late in autumn, cannot be overestimated. *T. mollis*, incorrectly known to the trade as *T. stans* var. *velutina*, also does well, but being a native of Guatemala it is much less hardy than the former. The growth is more upright and stiff, the leaflets are much larger, less serrate, and much darker green and the flowers, which are borne in terminal panicles, are smaller and without fragrance and the color is a much lighter yellow. It also flowers several weeks earlier than *T. stans*. The foliage looks crimped and often blackish, being attacked by a kind of aphis and by several fungi. *T. Smithii* is said to be a hybrid between *T. mollis* and *Tecomaria capensis*, raised near Melbourne, Australia, by Edwin Smith. The plant comes true from seed, and seedlings flower when about a year old, beginning to open their large clusters of yellow and reddish trumpets in April and continuing with short intervals until cut down by frost in December. (H. Nehrling.)

A. *Fls. pure yellow, funnelform-campanulate, abruptly contracted above the base.*

B. *Lvs. glabrous or nearly so.*

stans, Juss. (*Stenolobium stans*, Seem.). YELLOW ELDER. Upright shrub: lvs. odd-pinnate; lfts. 5–11, almost sessile, oblong-ovate to lanceolate, acuminate, serrate, glabrous, 2–5 in. long and ¾–1¼ in. broad: fls. in large, terminal racemes or panicles; corolla funnelform-campanulate, yellow, 1½ in. long; anthers pubescent; calyx with 5 short teeth: caps. linear, 5–7 in. long. Sept.–Dec. S. Fla. to W. Indies and S. Amer. B.M. 3191.—Sometimes called yellow bignonia. Fls. fragrant. Var. **angustata,** Rehd. (*Stenolobium incisum*, Woot. & Standley). Lfts. 7–11, lanceolate to linear-lanceolate, sharply or incisely serrate with flaring teeth, 1–3 in. long and ¼–½in. broad. Texas, Ariz., and Mex. This variety is hardier than the type, which is sometimes cult. as *T. sambucifolia;* the true *T. sambucifolia*, HBK., from Peru, which has glabrous anthers, is probably not in cult.

BB. *Lvs. villous or tomentose beneath.*

mollis, Humb. & Bonpl. (*T. velutina*, Lindl. *T. stans* var. *velutina*, Hort.). Similar to the preceding, but pubescent: lfts. 5–9, oblong-ovate, acuminate, less deeply serrate or almost entire, villous-pubescent on both sides or only beneath, 2–4 in. long: fls. like those of the preceding, but smaller and paler and not fragrant. Mex. to Chile and Peru.—It lasts in bloom much longer and the fls. keep well in water, a rare occurrence in this genus.

AA. *Fls. yellow and red, tubular-funnelform, gradually narrowed toward the base.*

B. *Lfts. obtuse or acutish.*

Smithii, W. Wats. Fig. 3783 (adapted from The Garden). Upright shrub: lvs. odd-pinnate; lfts. 11–17, oblong, obtuse or acutish, serrate, 1–2 in. long: fls. in large, compound panicles, sometimes 8 in. long and as broad; corolla tubular-funnelform, with 5 reflexed rounded lobes, bright yellow tinged with orange, 1½–2 in. long. Sept.–Jan. Intro. from Austral. and supposed to be a hybrid of *T. mollis* and *Tecomaria capensis*. G.C. III. 14:649. Gn. 48:23. I.H. 43:55, 107. Gt. 44, p. 52. G.M. 36:627. J.H. III. 42:371.—Blooming in the greenhouse in winter and well suited for cult. in pots. It has been said that it comes true from seed, but plants raised by Franceschi from seed received from the originator had mostly pure yellow fls.

BB. *Lfts. acuminate.*

Garrocha, Hieron. Glabrous small shrub: lvs. 3½–5 in. long; rachis narrowly winged; lfts. 7–11, short-stalked, oblong-ovate, acuminate, serrate, 1–2 in. long: fls. in slender racemes forming terminal panicles 4–6 in. long; calyx with long-acuminate teeth; corolla about 2 in. long, yellow with scarlet tube, slender, very gradually narrowed toward the base, limb ¾–1 in. across; anthers slightly exceeding the mouth: caps. 2½–4 in. long. July–Aug. Argentina.—A smaller and more graceful plant than *T. stans*, strikingly handsome with its bright yellow and scarlet fls.

T. æsculifolia, DC.=Tabebuia æsculifolia.—*T. amboinensis*, Blume. Evergreen climbing shrub: lvs. odd-pinnate with usually 5 elliptic-obovate lfts. 3–3½ in. long: fls. tubular-funnelform, red, 3–4 in. long, in lateral racemes. Amboina. Once offered by John Saul, but has probably now disappeared from cult. It is not a true Tecoma and belongs possibly to Pandorea.—*T. australis*, R. Br.=Pandorea australis.—*T. Brycei*, N. E. Br.=Pandorea Brycei.—*T. capensis*, Lindl.=Tecomaria capensis.—*T. chinensis*, Koch=Campsis chinensis.—*T. filicifolia*, Nichols.=Pandorea australis.—*T. fulva*, Don=Tecomaria fulva.—*T. grandiflora*, Del.=Campsis chinensis.—*T. hybrida*, Jouin=Campsis hybrida.—*T. intermedia*,

3783. Tecoma Smithii. (×¼)

Schelle=Campsis hybrida.—T. *jasminoides*, Lindl.=Pandorea jasminoides.—*T. leucoxylon*, Mart.=Tabebuia triphylla.—*T. Mackenii*, W. Wats.=Pandorea Ricasoliana.—*T. pentandra*, offered by the S. Calif. Acclim. Assoc., is unknown to the writer.—*T. pentaphylla*, Juss.=Tabebuia pentaphylla.—*T. radicans*, Juss.=Campsis radicans.—*T. Reginæ Sabæ*, Franceschi=Pandorea Brycei.—*T. Ricasoliana*, Tanfani=Pandorea Ricasoliana.—*T. rosea*, Bertol.=Tabebuia rosea.—*T. serratifolia*, Don=Tabebuia serratifolia.—*T. shirensis*, Baker=Tecomaria shirensis.—*T. spectabilis*, Planch.=Tabebuia spectabilis.—*T. Thunbergii*, Sieb.=Campsis chinensis var. Thunbergii.—*T. valdiviana*, Phil.=Campsidium chilense.—*T. Whitei*, C. H. Wright=Tecomaria shirensis.

ALFRED REHDER.

TECOMÀRIA (name derived from Tecoma, alluding to its affinity). *Bignoniaceæ*. Warm-country plants, grown for their showy bloom.

Evergreen shrubs with slender, often sarmentose branches: lvs. opposite, odd-pinnate; lfts. serrate: fls. in terminal panicles or racemes; calyx campanulate, regularly 5-toothed; corolla funnelform, slightly curved; stamens mostly exserted, with pendulous diverging cells; disk cupulate: caps. linear, compressed.—Five species in Cent. and S. Amer. and in S. Afr.

The tecomarias are half-climbing or nearly upright

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shrubs with handsome pinnate foliage and yellow, orange, or scarlet flowers in rather dense terminal clusters. They can be grown outdoors only in subtropical regions. Of the several species in cultivation only *T. capensis* seems to be planted in southern California and Florida. Moderate pruning in spring insures a more profuse blooming. Propagation is by seeds and by cuttings under glass in spring or in midsummer.

The cape honeysuckle, *T. capensis*, grows most luxuriantly in Florida gardens and in those all along the Gulf coast. It is usually grown on trellises on verandas

3784. Tectaria cicutaria.

and piazzas with a southern exposure. Of all the species this is the best and most suitable for verandas, being a dense and compact grower, evergreen, almost constantly in flower, easily kept in health and readily trained into shapely specimens. If the long shoots are cut back severely, the plant can be easily trained into shrub form. These long shoots, usually lying flat on the ground, readily strike root and form an excellent material for propagation. *T. capensis* and *Tecoma Smithii* are the only ones which grow and flower fairly well as pot-plants in northern greenhouses. They need good soil and rather large pots to do well. If not well cared for they lose most of their foliage and look poor and unshapely. (H. Nehrling.)

capénsis, Seem. (*Técoma capénsis*, Lindl.). Cape Honeysuckle. Half-climbing or nearly upright shrub: lvs. odd-pinnate; lfts. 7–9, broadly oval to ovate, acute, serrate, glabrous, ½–2 in. long: fls. in peduncled terminal racemes; corolla tubular, curved, with 4-parted spreading limb, the upper lip emarginate, orange-red to scarlet, about 2 in. long; calyx 5-toothed: caps. linear, 1–2 in. long. Aug.–Nov. S. Afr. B.R. 1117. L.B.C. 17:1672. R.H. 1895, p. 108.

T. fúlva, Baill. (Tecoma fulva, Don). Evergreen upright shrub to 15 ft. high.: lvs. odd-pinnate, with 9–13 small, ovate, toothed lfts.: fls. in terminal panicles, tubular-funnelform, slender, yellow, tinged red, 1¼ in. long; stamens slightly exserted. Peru. B. M. 4896. F.S. 11:1116.—*T. shirénsis*, Schum. (Tecoma shirensis, Baker. T. Whytei, C. H. Wright). Similar to T. capensis. Shrub, to 10 ft.: lfts. 9–13, ovate, serrate, 1–1½ in. long: corolla about 2 in. long, orange-yellow, the limb marked with red stripes. Nyassaland. B.M. 7970.

Alfred Rehder.

TECOPHILÆA (named for Tecophila Billotti, daughter of a botanist). *Amaryllidàceæ*. Chilean Crocus. Bulbous plants, useful for blooming in pots indoors early in the spring. Lvs. radical, few or 1, inclosed in a long scarious sheath at the base, blade spreading, linear or lanceolate: scape included with the lvs. at base in the sheath, otherwise leafless, 1-fld. or laxly few-fld.: fls. blue; perianth campanulate, 6 segms.; stamens 3 perfect and 3 staminodia; ovary 3-celled: caps. conical toward the top, loculicidally dehiscent.—Two species, Chile. The botanical position of Tecophilæa is open to discussion, but the inferior ovary seems to take it out of the Liliaceæ, with which it has been placed by some writers. The plants are useful for blooming in pots indoors early in spring. *T. violæflora*, Bert., does not appear to be introduced.

cyanocrócus, Leyb. (sometimes written *T. cyanocrocea*). Scapes 1–3, erect, 3–6 in. high, 1-fld.: lvs. 2–3, linear-canaliculate and undulate: fl. azure-blue with white throat, about 1½ in. long, with a narrow tube and obovate segms. G. 37:183. R.H. 1900:70. Var. **Leichtlinii,** Hort., has fls. deep blue with no trace of yellow; said by some to have a white center. Var. **Règelii,** Baker (not known to be in the trade), has longer peduncles, longer and narrower scarcely undulate lvs., and narrow oblong segms. Species hardy at New York City in protected places, but usually the plants do not thrive more than a year or two; they ought to do better farther south. Blooms very early in spring. Fls. violet-scented.

F. Tracy Hubbard.†

TECTÀRIA (Latin for cover, the indusium having shield-shaped coverings). *Polypodiàceæ*. A group of ferns, mostly of large and coarse habit, with superior reniform or heart-shaped indusia fixed by the sinus, as in Dryopteris, but with veins uniting freely to form areoles with free included veinlets.—About 25 species are known, largely from the E. Indies, a few from Trop. Amer. By some included in Polystichum.

decúrrens, Copeland. Lf.-stalks narrowly winged from a creeping rootstock: lvs. 2–4 ft. long, 1 ft. or more wide, cut down to a winged rachis and with 4–8 pairs of pinnæ 6–12 in. long, 1–2 in. wide: sori large, in 2 regular rows between the principal veins. India to Polynesia.

cicutària, Copeland. Fig. 3784. Caudex stout, erect, scaly above: lvs. 6–8 in. to 1½ ft. long; pinnæ horizontal, subsessile from a rather broad truncated base, 2–3 in. long: sori on disk of larger pinnules in 2 rows, oblong, those on terminal narrow segms. solitary, quite marginal. Trop. Amer.

TÉCTONA (derived from *Tekka*, the Malabar name of *T. grandis*). Syn., *Thèka*. *Verbenàceæ*. Tall trees, stellately tomentose, including the well-known teakwood, sometimes grown in the warmhouse as a curiosity. Lvs. opposite or ternately verticillate, large and entire: cymes dichotomous, many-fld., arranged in a large terminal panicle: fls. small, white or bluish, sessile; calyx campanulate, shortly 5–6-cleft, inflated in fr.; corolla-tube short, limb spreading, 5–6-cleft; stamens 5–6; ovary fleshy, 4-celled, cells 1-ovuled: drupe inclosed in the calyx, 4-celled; endocarp bony.—Three species, Asia, India, Burma, Malaya, and Philippines.

grándis, Linn. Teak. Tree, 80–150 ft. high: branchlets quadrangular: lvs. 8–12 in. (of seedlings sometimes 3 ft.), ovate, cuneate at both ends, close tomentose beneath: fls. white or bluish, numerous, but only a few fertile, in panicles 18 in. diam.; calyx stellately white-tomentose, 1 in. diam. in fr. when it is ovoid or subpyramidal; corolla scarcely ¼in. long. India, Malaya. —The timber of this important tree is much used in ship-building because of its durability, great strength, and the ease with which it can be worked. Not planted in this country except experimentally.

F. Tracy Hubbard.

TEÈDIA (named for J. G. Teede, German botanist). *Scrophulariàceæ*. Glabrous or pubescent shrubs, grown in the greenhouse. Lvs. opposite, ovate, entire: peduncles in the upper axils, bearing a few-fld. cymose infl.: fls. rose, rather small; calyx deeply 5-cleft, lobes narrow; corolla-tube cylindrical, limb spreading, 5-lobed, lobes subequal, rotundate; stamens 4: berry subglobose, indehiscent.—Two species, S. Afr. The foliage of both species has an objectionable odor.

lùcida, Rud. Glabrous: st. 4-cornered: lvs. oblong-ovate, acuminate, 2 in. long, decussate; petioles winged:

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panicles leafy, decussate: fls. rosy pink: seeds many, small. S. Afr. B.R. 209.—This species was intro. into S. Calif. some years ago, but appears to have lost favor. It is said to act like an annual there, but seeds freely and prefers half shade.

T. pubéscens, Burch., grows about 2 ft. high, rusty-pubescent or villous: lvs. ovate or elliptic, often broader than those of T. lucida.

F. Tracy Hubbard.

TELANTHÈRA (name refers to the fact that all ten parts of the staminal cup are equally developed). *Amarantàceæ*. Alternanthera. Small much-used bedding plants, popular in design work because they are compact and stand shearing well.

Apparently all the alternantheras used by gardeners as bedding plants belong to the genus Telanthera, which is distinguished from the true genus Alternanthera by having 5 anther-bearing stamens and 5 elongated antherless staminodia united into a cup or tube. In Alternanthera the tube is short or almost none, the anther-bearing stamens sometimes less than 5, and the staminodia short or none. Of Telantheras there are 40–50 species, mostly herbs, in Trop. Amer. and 1 in W. Afr. The lvs. are entire, ovate to elongated, opposite: fls. small, usually in dense heads in the axils, whitish or sometimes colored, perfect, each subtended by 2 bractlets. In Engler & Prantl, Die Natürlichen Pflanzenfamilien, Schinz retains Telanthera under Alternanthera, not dividing the group.

The alternantheras of gardeners are much used in carpet-bedding and for ribbon-borders, because of their low compact growth, the bright colors of the foliage, which holds its character throughout the season, and the ease with which they withstand shearing. They are usually kept within 6 inches of the ground. The plants are tender to frost, and grow best in warm sunny places. They comprise the stock plants for the foundation work in carpet-bedding. The flowers are inconspicuous and of no account to the gardener.

The plants are propagated by cuttings or division. In either case, they must be carried over winter in the greenhouse or in hotbeds, preferably in the houses at the North. The plants should be kept at 60° or 65° during winter, and rather dry to hold them more or less dormant. Place them where they will receive only enough light to keep them healthy. (1) Cuttings are usually made in August from strong plants growing in the open. The cuttings may be struck in shallow flats and then wintered in these flats without transplanting. The cuttings should be well established before winter sets in, else they will remain weak. In March or April they may be potted off, preparatory to using them in the open. (2) Division is usually preferred by gardeners who have much bedding to do. The plants are lifted after the first frost, cut back to 3 or 4 inches long, and planted in flats. In March or April, the plants are divided and the parts (with the old roots shortened in) potted or transplanted to other flats. However grown, the plants should have four to six weeks in a hotbed if possible, before they are placed in the open ground. Even in the warm greenhouse they usually make slow growth in March and April.

The botanical status of the garden alternantheras is imperfectly understood, and the group needs careful study from living plants. Various garden names cannot be accounted for at present. The common garden alternantheras appear to have issued from the first three following Brazilian species.

A. *Lvs. essentially lanceolate or elliptic.*

amœna, Regel. Fig. 3785. Very dwarf: lvs. long-lanceolate or oblong-lanceolate, sometimes elliptic, acuminate, very short-petioled, the under color mostly green but veined and blotched with red and orange: fl.-heads sessile, single, in pairs or 3's, and terminal. I.H. 12:447; 15:558.—To this apparently belong the garden names *amabilis*, *spectabilis*, *sessilis*, *rosea*, *Reinhardii*.

AA. *Lvs. essentially spatulate.*

Bettzickiàna, Regel (originally, in 1862, spelled as here, but changed by the author in 1862 to *Bettzichiana*). Fig. 3785. Plant described as suffruticose and erect, the st. branched at base and terete, adpressed-pilose but becoming glabrous: lvs. narrow, spatulate, narrowed into long petiole, apex acuminate and somewhat mucronate: fl.-heads sessile, single, in pairs or 3's, terminal and axillary; bracts ovate-lanceolate, acuminate, nearly or quite entire; staminodia much shorter than stamens, 2–3-cut at apex.—To this variable species appear to belong the garden names *picta*, *tricolor*, *aurea*, *aurea nana compacta*, *paronychioides*, *versicolor aurea*, *magnifica*, and others. Var. **typica**, Regel (*Alternanthèra paronychioides*, Hort.), is low, 2–3 in. tall, with olive-colored lvs. and the upper ones red at apex. Var. **spathulàta**, Regel (*A. spathulàta*, Lem.), is 6–8 in. tall, the st. and lvs. red. I.H. 12:445.

versícolor, Regel. Fig. 3785. Usually becoming taller, much branched, and apparently less used for carpet-bedding than the others: lvs. round-spatulate, narrowed into a short petiole, the colors mostly in shades of copper-red or blood-red, with patches of green between the veins: fl.-heads sessile, single or in pairs. I.H. 12:440.

ficoídea, Moq. St. herbaceous, repent at base and ascending, angled and striate, glabrous, or puberulent above and in the lf.-axils: lvs. spreading or deflexed, short-stalked, broadly lanceolate, attenuate and somewhat acute, mucronulate, the margin undulate-repand: heads ⅛–¼in. long, sessile, solitary or in 2's; bracts

3785. Spray of Telanthera amœna; also leaf-outlines of *a*, T. amœna; *b*, T. Bettzickiana; *c*, T. versicolor. (×1)

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acuminate-cuspidate, much longer than outer sepals. Brazil.—The *T. ficoidea*, Hort., may be a form of one of the other species. L. H. B.

TELÈKIA: *Buphthalmum.*

TELÈPHIUM (an old Greek name). *Caryophyllàceæ*, in Engler & Prantl, Die Natürlichen Pflanzenfamilien; *Ficoìdeæ*, in Bentham & Hooker, Genera Plantarum. ORPINE. One species, *T. Imperàti*, Linn., is listed abroad as a hardy perennial but it has little to commend it to the cultivator: it is a low plant with woody base and slender prostrate sts., with erect or ascending branches: lvs. many, ¼in. long, alternate or scattered, oval or elliptic, entire: fls. several and inconspicuous, in small compact clusters. Perhaps valuable on banks or as a carpeter.

The genus Telephium comprises 2 or 3 species in the Medit. region, being diffusely branched and glaucous herbs: lvs. alternate, paired or opposite, without distinct midrib or nerves: fls. small, in compact terminal clusters, the 5 petals white but not showy; sepals 5, persistent; stamens 5; ovary ovoid, 3-angled and usually 3-celled, the styles 3 and short: fr. a dry caps. included in the calyx. L. H. B.

TELFÀIRIA (named after Charles Telfair, 1778–1833). *Cucurbitàceæ*. Climbing shrubs, occasionally grown in the warmhouse, of economic value in the tropics. Lvs. digitately compound; lfts. 3–5, oblong, auriculate at the base on the outside; tendrils lateral and 2-cleft: fls. dicœcious, medium or large, male pedicels bracteate, pale purple; male racemose, calyx turbinate, lobes lanceolate; corolla rotate, 5-parted, segms. obovate-cuneate, elongated, fimbriate-tendrilled; stamens 3; female solitary, calyx and corolla like male; stamens rudimentary or none; ovary oblong, 3–5-celled: fr. elongate, base swollen, many-seeded; seeds edible.—Two species, Trop. Afr.

pedàta, Hook. (*Fevillæa pedàta*, Sims). Root stout, fleshy: st. perennial, 50–100 ft. long: lvs. long-petioled; lfts. 3–5 in. long, acuminate, repand-toothed, glabrous except nerves beneath: fls. pale purple, fringed, male 2 in. across; petals obovate-cuneate; female fls. about 4 in. across; ovary obtusely 10-ribbed: fr. fleshy, sometimes weighs 60 lbs., 200–300-seeded; seed 1 in. broad, edible. Zanzibar. B.M. 2681; 2751, 2752.—Intro. into S. Calif. but not successful. The seeds are roundish, about an inch across, and the kernels are sweet to the taste, and are said to be as good as almonds. The negroes of Trop. Afr. boil and eat them. These seeds also yield an abundance of oil which has been said to be equal to olive oil. The fr. becomes 1½–3 ft. long and 8 in. wide. It is oblong in shape, has 10–12 deep furrows, and is always green. Both male and female fls. are 5-lobed, copiously fringed and purple in color, the females somewhat brownish, with a circular green throat, while the males have a 5-pointed star of green in the middle. The male fls. are about 2 in. across, females 4 in. across, with an ovary 2 in. long. The foliage has an unpleasant smell when bruised.

T. occidentàlis, Hook. f., is very similar to T. pedata, but the lfts. are all triple-nerved from near the base (those of T. pedata all at an angle of 45° from the midrib): fls. smaller. Upper Guinea. Said to be cult. for the seeds which the negroes boil and eat.

F. TRACY HUBBARD.†

TÉLLIMA (anagram of Mitella). *Saxifragàceæ*. Erect rather simple hardy herbaceous perennials, the western American representatives of Mitella, well adapted to the wild-garden.

Plants pilose or glandular: lvs. petioled, subrotund-cordate, lobed, dentate; stipules none or adnate to the base of the petioles: fls. pedicelled, nodding, greenish or white, petals rarely reddish; calyx-tube large, dilated or inflated, campanulate, 5-toothed or 5-cleft; petals 5, usually elongate, entire, 3-fid or pinnatifid, sessile or clawed; stamens 10; ovary semi-superior, conical, 1-celled: caps. membranaceous, 1-celled, many-seeded.—About 10–12 species, W. N. Amer. Tellima differs from Mitella mainly in the caps., which is 2-beaked in Tellima, not beaked in Mitella.

A. *Petals pinnately cut into long, thread-like segms.*

B. *Fls. not fragrant.*

grandiflòra, R. Br. FALSE ALUM ROOT. Height 1½–2¼ ft.: lvs. rounded, cordate or angle-lobed and toothed: fls. greenish, becoming pink or red; calyx inflated-bell-shaped, nearly ½in. long; petals laciniate-pinnatifid, sessile. Calif. to Alaska. B.R. 1178. Var. **rùbra,** Hort., grows 1 ft. high, has red foliage and yellow fls.

BB. *Fls. fragrant.*

odoràta, Howell. Height 1–2 ft.: lvs. broadly cordate, obscurely lobed and crenately toothed: fls. red. Wet places near Colombia River.

AA. *Petals palmately 3–7-lobed or -parted.*

B. *Basal lvs. not divided to near the base.*

affìnis, Gray (*Lithophrágma affìnis*, Gray). Sts. stout, 1–2 ft. high: lvs. radical, roundish in outline, crenately lobed, varying into the cauline; cauline mostly parted into 3 broad divisions, which are deeply incised or merely toothed: calyx turbinate; petals 3-lobed at the apex. Ore. to S. Calif.

BB. *Basal lvs. divided to near the base.*

parviflòra, Hook. (*Lithophrágma parviflòra*, Nutt.). Height ¾–1 ft.: radical lvs. mostly 3–5-parted or -divided, the divisions narrowly cuneate and once or twice 3-cleft into narrow lobes: fls. pink or sometimes white; petals with a slender claw, the limb palmately 3–7-parted. Brit. Col. to Utah and Colo.

T. rubrifòlia, Hort., is offered in the trade abroad, as a plant growing 1 ft. high with beautiful foliage and very pretty fls. Probably it is T. grandiflora var. rubra. F. TRACY HUBBARD.†

TELÒPEA (Greek, *seen at a distance*, of fanciful application). *Proteàceæ*. Tall shrubs, occasionally grown in the greenhouse and one species has been experimented with in S. Calif., but so far has not proved very successful. Lvs. alternate, entire or dentate: fls. showy, red, hermaphrodite, twin-pedicelled, densely racemose; racemes terminal, subglobose or ovoid; bracts exterior, membranaceous, colored; perianth-tube elongated, segms. at length more or less separated; disk fleshy, strongly oblique but almost perfectly annulate; ovary long-stipitate, many-ovuled: follicle stipitate, oblique, leathery, recurved.—Three species, 2 Australian, 1 Tasmanian. An earlier name of the genus is Hylogyne, but Telopea is included in the list of "nomina conservanda" accepted by the Vienna Congress.

speciosìssima, R. Br. (*Embòthrium speciosìssimum*, Smith). WARATAH. WARRATAU. Stout glabrous shrub 6–8 ft. high: lvs. cuneate-oblong, 5–10 in. long, mostly toothed in the upper part, coriaceous: fls. crimson, in a dense ovoid or globular head 3 in. across: involucral bracts colored, the inner ones 2–3 in. long. New S. Wales. B.M. 1128. G.C. II. 17:677; III. 55:348. Gn. 22:400. I.H. 34:29.—One of the showiest shrubs of New S. Wales. The heads are 3 in. across and 3–4 in. deep and bear a rough resemblance to a florist's chrysanthemum. The showiest parts, however, are involucral bracts. This plant is known as waratah. It is one of the most distinct members of its family, for a horticultural account of which see *Protea*. Seeds of this species are imported into Calif. frequently, but although they germinate readily, the seedlings damp-off still more readily. Probably if the plant were once established it could be easily prop. by layering or by cuttings. F. TRACY HUBBARD.†

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TEMPLETÒNIA (J. Templeton, botanist of Belfast, early part of 19th century). *Leguminòsæ*. CORAL BUSH. Shrubs or rarely subshrubs, cult. in the greenhouse abroad and hardy outdoors in the extreme S., where they may be used as ornamentals. Lvs. alternate, simple, entire or reduced to minute scales; stipules small or none: fls. red, yellow, or purple, axillary, solitary

3786. Tephrosia macrantha. (×⅓)

or 2 or 3 together; calyx 5-lobed, lobes unequal; standard orbicular or obovate, usually reflexed; wings narrow; keel as long as the standard or shorter; stamens all united in a sheath open on the upper side; ovary sessile or stipitate: pod sessile or stipitate, much flattened, ovate-oblong or linear, completely dehiscent.—About 8 species, Austral. Said to do best in a mixture of sandy loam and peat. Prop. by cuttings.

retùsa, R. Br. (*T. glaùca*, Sims). CORAL BUSH. Tall glabrous or glaucous shrub: lvs. broadly obovate to narrow-cuneate-oblong, sometimes all under ¾in., sometimes all over 1 in. long, emarginate or mucronate, coriaceous: fls. red (or rarely white); calyx with 4 very short, broad teeth, the lowest longest: pod 1½–2 in. long. B.M. 2088; 2334. B.R. 383; 859. L.B.C. 6:526; 7:644.—Cult. in S. Calif. where it blooms in the winter.

F. TRACY HUBBARD.†

TEOSINTE: *Euchlæna*.

TEPHRÒSIA (Greek, *tephros*, ash-colored, hoary; referring to the foliage). *Leguminòsæ*. Hardy or half-hardy perennial herbs, subshrubs, or rarely shrubs, of little horticultural value.

Leaves uneven-pinnate; lfts. numerous, rarely 1–3, linear; stipules bristle-like or broader and striate: racemes terminal, opposite the lvs. or in the upper axils: fls. in fascicles of 2–6, red, purple, or white; calyx-lobes subequal or the 2 upper longer; petals clawed, standard suborbiculate, outside more or less silky-villous; wings obliquely obovate or oblong; keel incurved, obtuse or rather acute; ovary sessile, many-ovuled: pod linear, rarely ovate, compressed 2-valved.—About 170 species, natives of the warmer regions of the world.

grandiflòra, Pers. (*Galèga grandiflòra*, Vahl). Rigid shrub 1–2 ft. high, pubescent or nearly glabrous: lvs. short-petioled; lfts. 5–7 pairs, cuneate-oblong or linear-oblong, variably pubescent on both surfaces: fls. fasciculate-corymbose, red, fulvescent on the outside, 8–10 lines long: pod broad, linear, plano-compressed. S. Afr. B.R. 769.

virginiàna, Pers. (*Crácca virginiàna*, Linn.). GOAT'S RUE. CATGUT. WILD SWEET PEA. HOARY PEA. Silky-villous: st. erect, simple, 1–2 ft. high, leafy to the top: lfts. 17–29, linear-oblong: fls. large and numerous, clustered in a terminal, ellipsoid, dense raceme or panicle, yellowish white marked with purple. June, July. Dry sandy soil, southern N. H. to Minn. and southward.

macrántha, Rob. & Greenm. Fig. 3786. Shrub, 6–10 ft. tall: lvs. odd-pinnate; lfts. about 10–12 pairs, oblong-linear, entire, short-acute or cuspidate: fls. in loose terminal panicles 1 ft. long, shaded purple and white, nearly as large as sweet peas; standard very large, erect, oblong-orbicular. Mex. G.F. 7:175 (reduced in Fig. 3786).—A very showy plant, deserving of planting where hardy. Pringle writes that "for weeks it lights up the thickets of hillside ravines with masses of pleasing color."

F. TRACY HUBBARD.†

TERMINÀLIA (alluding to the leaves being borne upon the terminus of the shoot). *Combretàceæ*. Only one species, *T. Catappa*, the Indian almond or tropical almond, is well known in American horticulture, but several others are important in the Orient, principally for their fruits, known as myrobalans, which are used in dyeing, tanning, and in medicine.

Leaves alternate, or rarely opposite, often crowded toward the ends of the branchlets, usually petiolate and entire: fls. sessile or nearly so, small, hermaphrodite or polygamo-dicœcious, usually in elongated spikes but sometimes in heads; calyx-tube ovoid or cylindrical, constricted above the ovary, the limb urn-shaped or campanulate, 5-toothed, usually deciduous; petals none; stamens 10, in 2 series, the 5 inferior opposite the calyx-teeth, the 5 superior longer, alternating with the teeth; filaments exserted, subulate or filiform; anthers small, the lobes scarcely connected; ovary unilocular, style subulate, often villous at base, stigma simple; ovules 2, rarely 3: fr. a drupe, ovoid, angular, compressed or 2–5-winged, 1-seeded, the cotyledons convolute.—A genus of about 100 species distributed throughout the tropics, principally in S. Asia, with only a few in Amer.

Catáppa, Linn. TROPICAL ALMOND. INDIAN ALMOND. MYROBALAN. ALMENDRO. AMENDOEIRA. Fig. 3787. A tall, stately tree, up to 80 ft. high, with horizontal branches arising from the primary axis in whorls 3–6 ft. apart: bark smooth, brownish gray: lvs. clustered at the ends of the young branchlets, alternate, entire, obovate, obtuse to subacuminate at the apex, attenuate toward the slightly auricled base, 6–12 in. long, 3–6 in. broad, coriaceous, glabrous above, very finely pubescent below, venation slightly raised on both surfaces but most prominent below; petiole stout, under 1 in. long, flattened above, rusty-pubescent: fls. whitish, upper ones staminate and lower ones perfect, in finely pubescent spikes up to 6 in. long; calyx-segms. acute, slightly concave, valvate in bud, finely pubescent; filaments subulate, inserted upon the hairy disk; anthers cordate: fr. broadly oval in outline, elliptical and 2-

3787. Nut of tropical almond.—Terminalia Catappa. (×⅗)

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winged in transverse section, 1½–2 in. long, indehiscent, greenish or reddish, glabrous, with a firm, fleshy exocarp and a hard endocarp inclosing the oblong-elliptical seed; testa membranous, the cotyledons whitish, inrolled spirally. B.M. 3004.—Indigenous to beach forests of the Andaman Isl., but now cult. widely throughout the tropics; Schimper points out that the frs. are adapted for dispersal by ocean currents, the thick husk containing air-cells enabling them to float for a long time. The tropical almond (so-called, but not related to the true almond) is extensively planted in S. Fla., the W. Indies, Cent. and S. Amer., as a street and ornamental tree. Its greatest disadvantage seems to be that it is deciduous during the cold season (shedding its lvs. twice a year in Ceylon, according to Macmillan), but the rich reddish hues assumed by the foliage before falling make it very attractive. There are many fine avenues planted to it throughout the tropics. The nut seems to be much less esteemed in Amer. than in the Orient. Firminger describes it as "of a fine filbert-like flavor, with a crispness like that of a fresh walnut; beyond comparison the most delicious of any kind of nut the country (India) affords." He also states that the kernels, when removed from the husk, are generally served on the table in a plate of water. They yield a valuable oil, resembling almond oil, which is used in India. The tasar silkworm is fed on the lvs., according to Watt. In S. Fla. this is one of the most popular ornamental trees for street and avenue planting. It is not grown in Calif., and is probably too tender for most locations in that state. Prop. seems to be exclusively by seed.

T. Arjùna, Bedd., a large tree indigenous to Cent. and S. India, and cult. in other parts of the country, has recently been intro. to the U. S. and is doing finely in S. Fla. The bark is sometimes used in dyeing and tanning, according to Watt, and also in native medicine. —*T. austrâlis*, Cambess., Brazil and Argentina, has been intro. in S. Calif.: described as a medium-sized and very rapid-growing tree of symmetrical shape, suitable for street planting: lvs. small for the genus, lanceolate, acute or obtuse, shining above: fls. in roundish congested long-peduncled heads: drupe glabrous, ovate-lanceolate, beaked, with plicate margin.—*T. Bellérica*, Roxbg., the beleric myrobalan, a large tree found throughout the forests of India, Burma, and other parts of S. Asia, yields a fr. which is exported from India for use in tanning. The kernels are eaten in India, but are said by Watt to cause intoxication if taken in excess. —*T. Bénzoë*, Pers., properly T. angustifolia, Jacq., has recently been intro. to S. Fla., and promises to succeed. It is a handsome tree with narrow lvs., indigenous to Malaya.—Under the name of *T. edùlis*, Blanco, a plant has recently been intro. to the U. S. from the Philippines which is probably T. Bellerica. It is doing well in S. Fla. and promises to be an unusually handsome ornamental. Barrett says of it "this magnificent large forest tree occurs, not very commonly, in the provinces of Bataan and Cavite (Philippines). In the rainy season abundant crops of cherry-like frs., about 2–3 cm. in diam., are produced. Each fr. contains 1 seed surrounded by sweet pulp somewhat resembling that of the duhat (Eugenia jambolana) in flavor. The pulp with the addition of lemon or some other acid juice makes a beautifully colored jelly." The tree is known as "calompit" in the Philippines.

F. W. Popenoe.

TERNSTRŒ̀MIA (named for Christopher Ternstrœm, Swedish naturalist; died 1745). *Ternstrœmiàceæ*. Evergreen trees or shrubs, adapted to the warm-house. Lvs. leathery, entire or serrate-crenate: peduncles 1-fld., recurved, axillary or lateral, solitary or somewhat fascicled, 2 bracteoles below the fl.: sepals 5; petals 5; stamens numerous; ovary 2–3-celled (sometimes imperfectly so): fr. indehiscent.—About 45 species, warmer Asia, Indian Archipelago and Trop. Amer.

japónica, Thunb. (*Cleyèra japónica*, Thunb., not Sieb. & Zucc. See *Cleyera*.). Small tree or shrub, 10–12 ft.: lvs. alternate, short-stalked, entire, obovate-oblong or oblong, glabrous, feather-veined: fls. clustered: berries about the size of peas. Japan. S.Z. 1:81.

TESTUDINÀRIA (from *testudo* a tortoise, alluding to the supposed resemblance to a tortoise of the above-ground roots). *Dioscoriàceæ*. The Hottentot's Bread, Tortoise Plant, or Elephant's Foot. Perennial plants bearing a slender twining vine from a large hemispherical rhizome or caudex which is above ground and solid-fleshy or woody; sometimes grown in the greenhouse as curiosities or for illustration to students of botany, but not in common cultivation.

Stems twining, slender, herbaceous: lvs. alternate, caudate or somewhat deltoid: fls. dicœcious, small, racemose at the axils; perianth of male fls. broad-campanulate, 6-cleft, stamens 6, styles rudimentary; perianth-segms. of female fls. small, staminodia small; ovary ovoid or oblong, 3-celled: caps. 3-angled, angles prominent, cuneate-wing-like.—Three species from S. Afr.; a fourth has been described from Mex.

elephántipes, Salisb. Rootstock studded with angular woody protuberances, sometimes 1–3 ft. diam.: sts. slender, glabrous, much branched, twining, 8–10 ft. high: lvs. suborbicular, bright green or glaucous, mucronate: fls. small, inconspicuous, the racemes greenish yellow or whitish. S. Afr. B.M. 1347 (as *Tamus*. B.R. 921.—The globular yam-like bulb or rootstock sometimes weighs 100 pounds. The inner part of this "bulb" has been compared to a turnip for texture and color. The Hottentots used to cut it in pieces, bake it in the embers and eat it. Old and grotesque bulbs have been brought from time to time from the Cape as curiosities. The plant is of easy cult. in a cool greenhouse. No method of prop. by the bulb is known.

paniculàta, Duemmer. Rootstock above ground, about 3 in. high, irregularly oblong, woody, flattened above, tessellately lobed, fuscous: sts. twining above, rigid, glabrous, greenish: lvs. 1–3 x 1½–4½ in., broadly reniform or shortly deltoid-subcordate, obsoletely 3-lobed, mucronate, petioled: panicles axillary, many-fld., sparsely or much branched: fls. pedicelled, odorous, rather greenish or pale yellowish. S. Afr.

F. Tracy Hubbard.†

TETRACÉNTRON (Greek, *four* and *spur*, referring to the 4 spur-like appendages of the fr.). *Magnoliàceæ*. A deciduous tree from China with alternate petioled ovate lvs. palmately 5–7-veined, serrate, exstipulate: fls. sessile, small, perfect, in slender pendulous racemes, apetalous; sepals 4, ovate, imbricate; stamens 4, inserted before the sepals, exserted; carpels 4, connate along the ventral suture; styles 4, recurved; ovules pendulous, several in each cell: fr. a 4-celled deeply lobed caps., loculicidally dehiscent; seeds linear-oblong. Next to Cercidiphyllum this is the tallest deciduous tree of China, attaining occasionally to 100 ft., and 20 ft. in girth. In its foliage it bears a strong resemblance to Cercidiphyllum, though not closely related, but it is easily distinguished by the alternate lvs., solitary, not in 2's on the spurs. It has proved hardy at the Arnold Arboretum, at least in sheltered positions, but does not seem to grow so well as Cercidiphyllum, with which it probably shares the same exigencies as to cult. and prop.

T. sinénse, Oliver. Tall tree with smooth pale or rufous gray bark: lvs. slender-petioled, ovate or elliptic-ovate, acuminate, cordate at the base, bluntly serrate, 3–5 in. long: racemes 2½–4 in. long, short-stalked, slender; fls. yellowish, minute; the exserted stamens about 1 line long: caps. brown, ½in. long. June, July. Cent. and W. China. H.I. 19:1892.—The tree needs to be further tested in this country.

Alfred Rehder.

TETRADŸMIA (*four together*, from Greek words, referring to the 4-fld. heads of one species). *Compósitæ*. A genus of low rigid shrubs of the composite family native to the arid regions of W. N. Amer. Herbage covered with dense matted wool: lvs. alternate, often modified into spines. The original species, *T. canescens*, is the best known. Its heads have only 4 fls. They are yellow and about ½–¾in. long. This plant was offered in the E. in 1881 by western collectors but has no horticultural standing and is now probably not in cult. in Amer. There are about a half-dozen species, but not known horticulturally.

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TETRAGÒNIA (Greek, *four-angled*, referring to the usually four-angled fruit). *Aizoàceæ*. Here is included a garden vegetable of minor importance.

Herbs or subshrubs from the southern hemisphere and Japan; usually decumbent: lvs. alternate, short-petioled, somewhat fleshy: fls. yellow, green, or reddish, axillary, apetalous; calyx 3–5-lobed.—Only 1 species in cult., but 20 or more species are known in E. Asia and the southern hemisphere.

expánsa, Thunb. NEW ZEALAND SPINACH. NEW ZEALAND ICE-PLANT. Fig. 3788. A hardy or half-hardy annual 4–8 in. high, often spreading 4–6 ft.: lvs. triangular, larger ones 4–5 in. long by 2–3 in. broad: fls. small, yellowish green. New Zeal. B.M. 2362.

New Zealand spinach is chiefly useful for furnishing greens during the summer when the common spinach cannot be grown. It tastes something like spinach but is somewhat tougher, as a rule. It is grown to some

3788. Tetragonia expansa. (×½)

extent in California both for man and sheep. It readily self-sows. For an early outdoor crop, fresh seed should be sown in rich soil in a warm room in January or early February. The seed may germinate in a week or ten days but frequently requires a month to start. After growing about two weeks the seedlings should be transplanted to thumb-pots and about a month later to 4-inch pots. Growing vigorously in this condition they will be good-sized plants to move into the garden toward the end of April, where they should be set 3 to 4 feet apart each way, and the plants, when grown, will entirely cover the ground. They should be handled with great care in transplanting, otherwise growth will be so checked that it will require several weeks to recuperate. Again, plants should never be allowed to become pot-bound, as this will immediately bring them into flower and fruit and stunt their further growth, as well as greatly shorten their period of productiveness. Well-grown plants should be ready for use by June 1 and, if vigorous growth continues, nearly a peck of greens can be gathered from each plant once a week until heavy autumn frosts. In gathering, only 4 or 5 inches of the tip ends of the larger plants should be taken. In the South, it is usually dwarf, not generally exceeding 6 to 8 inches. There is another and somewhat easier method of growing the crop, although a given area will be less productive. Inasmuch as the plant is a hardy annual, many seeds which ripen late in autumn will fall to the ground and germinate early in spring, though not early enough for the plants to be injured by spring frosts. These will be large enough for use toward the end of June. Annual crops are thus grown on the same ground several successive seasons with no care except removing old plants and keeping the ground free from weeds.

For the forcing-house crop, seed should be sown during July in seed-beds where the plants remain until the latter part of September, when they should be taken directly to the benches and will be ready for use early in November. It is best to set the plants about 18 inches apart in benches at least 6 inches deep. No further attention is necessary except to give plenty of water, and under good conditions a peck of greens will be produced once a week on 4 square feet from November to May inclusive. A crop may also be grown beneath the benches near the walks, as well as in the grapery borders. Space that cannot be used for other purposes may thus be utilized to very good advantage, although the plants will not produce so abundantly.

This crop may also be grown in houses with portable roofs by starting the plants in summer in houses with the roofs removed, the roofs being replaced on the approach of cold weather. The plants will continue producing the entire winter and following spring, when they should be uncovered and will reproduce themselves in the same way as the summer crop.

H. C. IRISH.

TETRAGONÓLOBUS: *Lotus*. The following species now in cult. was not treated in Vol. IV, p. 1917. **Lòtus siliquòsus**, Linn. (*Tetragonólobus siliquòsus*, Roth). Perennial, trailing, hirsute: rhizome slender, branched: sts. ascending: lvs. oblong or obovate; petioles with the stipules shortly adnate: peduncles 1-fld., much longer than the fl.: fls. pale yellow; calyx-segms. lanceolate: pod with straight wings much narrower than the body. Medit. region.

TETRAMÌCRA: *Leptotes*.

TETRANÈMA (Greek, *four* and *filament;* the genus is characterized by having 4 stamens). *Scrophulariàceæ*. Perennial herbs, grown in the greenhouse. St. very short or in cult. slightly elongated, ascending: lvs. nearly radical, opposite, obovate or oblong, slightly crenate-dentate, base angulate, glabrous: peduncles axillary, scape-like, longer than the lvs., bearing an umbel-like cyme at the top: fls. short-pedicelled, nodding, purple-violet, variegated paler; calyx 5-parted; corolla declinate, posterior lip shortly 2-lobed, anterior larger, 3-cleft; stamens 4: caps. rather compressed, loculicidally dehiscent.—Two species, Mex. and Guatemala. **T. mexicànum**, Benth., is the only species cult., known as the "Mexican foxglove" and formerly as *Pentstemon mexicanus*. The pretty fls. are borne in profusion on the summits of slender purple scapes 6–8 in. high. Although essentially a summer bloomer, with good care it may be made to flower most of the year. It is usually regarded as a warmhouse subject, but it makes a good window-plant and is easy to grow. Plants continue to bloom year after year. Prop. by seeds. B.M. 4070. B.R. 29:52. H.U. 6, p. 71.

F. TRACY HUBBARD.†

TETRÁPANAX (*four* and *panax*, referring to the four-merous flower structure). *Araliàceæ*. By Bentham & Hooker (Genera Plantarum) this genus is included in Fatsia, and is so treated in Vol. III, page 1204. By others, however, it is kept distinct, and the plant known as *Fatsia papyrifera* then becomes **T. papyriferum**, Koch, the only species. The reader may take his choice whether to name the plant in one genus or the other;

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the preference probably lies with placing it in Tetrapanax. This genus, if accepted, differs from Fatsia in its four-merous rather than mostly five-merous flowers, with two-merous ovary, the tomentose-lanate character, and other features. *T. papyriferum* is an excellent subtropical subject.

Fatsia japonica, Decne. & Planch., remains in that genus, as treated on page 1204.

TETRASTÍGMA (Greek, *four* and *stigma*, in reference to the 4-lobed or 4-parted stigma). *Vitàceæ*. About 40 species in Trop. and Subtrop. Asia of shrubs climbing by tendrils: lvs. alternate, digitate or pedate; lfts. 3–5, sometimes reduced to 1; tendrils with adhesive disks or twining: fls. polygamo-dicœcious, in axillary cymes or umbels, 4-merous; petals spreading; disk adnate to the base of the ovary; stigma sessile, 4-lobed or 4-parted: berry 2–4-seeded; seeds ovoid-globose, sulcate on the inner surface. Allied to Cissus and Parthenocissus but easily distinguished by the sessile 4-lobed stigma and from the latter by the 4-merous fls. Of the numerous species only the following are occasionally cult.; *T. oblectum* and *T. serrulatum* are probably the hardiest, but tender in the N., and are graceful small-lvd. vines which may be used where vines of more delicate character are desired; the first species clings to walls, the second has twining tendrils. *T. Harmandii* is a tall-growing vine with larger lvs. and edible berries, suited only for tropical or subtropical countries. For cult. and prop., see *Cissus* and *Parthenocissus*. **T. obtéctum**, Planch. (*Cissus obtécta*, Wall.). Climbing with disciferous tendrils: branchlets hirsute: lvs. long-stalked, persistent or subpersistent; petioles pubescent; lfts. 5, digitate, sessile, cuneate-obovate to elliptic, acute, remotely crenate-serrate with mucronate teeth, glabrous, or in var. *pilòsum*, Gagnep., pubescent beneath, ½–1½ in. long: fls. greenish, in slender-stalked umbels; pedicels slender: berries ovoid, ¼in. long. Himalayas, Cent. and W. China. **T. serrulàtum**, Planch. (*Cissus serrulàta*, Roxbg. *Vitis capreolàta*, Don). Climbing with twining tendrils, glabrous: lfts. 5, pedate, sometimes 3, short-stalked, ovate or elliptic to elliptic-lanceolate, acute or acuminate, serrate, ½–2½ in. long: fls. in compound cymes: fr. globose, black, ¼in. thick or slightly larger. Himalayas, W. China. **T. Hármandii**, Planch. High climbing with twining tendrils: lfts. 3–5, short-stalked, narrowly lanceolate, serrate, glabrous, about 2–3 in. long: fls. in axillary short-stalked cymes: fr. globose, 2–3-seeded. Philippine Isls. Recently intro. by the Dept. of Agric.; said to have edible berries similar to those of the Scuppernong grape.

ALFRED REHDER.

TETRATHÈCA (Greek, *four* and *cell;* the anthers are sometimes four-celled). *Tremandràceæ*. Slender glabrous or stellate-pubescent, heath-like little shrubs, grown in the greenhouse and out-of-doors in the far South.

Leaves alternate, verticillate or scattered, heath-like, entire, flat and toothed or reduced to minute scales: fls. 4–5-merous; stamens apparently in a single series; disk inconspicuous: caps. opening only at the edges.—About 20 species, all from Austral. In European greenhouses all the plants of this family are considered difficult of cult. They are treated like many other Australian heath-like plants, being potted in fibrous peat and silver sand and watered carefully at all times. It is said that only soft rain-water should be used.

A. *Sts. terete, leafy.*

B. *Lvs. mostly verticillate.*

thymifòlia, Smith. Lvs. almost all verticillate in 3's or 4's, ovate-elliptical or lanceolate: fls. purple; sepals ovate-lanceolate, acute or acuminate, seldom reflexed; ovary glabrous or more frequently pubescent, with 2 superposed ovules. B.M. 8028.

ericifòlia, Smith. Subshrub 1 ft. or less high, branched, rough-pubescent or nearly glabrous, rarely hirsute: lvs. mostly verticillate, narrow-linear, margins closely revolute, rarely oblong-lanceolate and more open: fls. pink, on slender pedicels; sepals ovate, obtuse, not reflexed; ovary glabrous or rarely pubescent with 2 superposed ovules: caps. obovate-cuneate. R.B. 28:121.

BB. *Lvs. rarely somewhat verticillate.*

pilòsa, Labill. Much branched, glabrous or hispid, about 1–1½ ft.high: lvs. usually linear, margins much revolute, 4–6 lines long: fls. purple, rather small; sepals ovate, obtuse or acute; petals narrow; ovary glabrous or pubescent, 1-ovuled: caps., obovate. F.S. 10:1065 (as *T. ericoides*). Gn.W. 20:361.

AA. *Sts. very angular or flat, almost leafless.*

hirsùta, Lindl. Sts. rather rigid and erect, 6–18 in. high, minutely pubescent and often hispid with few long spreading reddish hairs: lvs. mostly alternate, ovate-lanceolate to oblong-linear, obtuse, all less than ½in. long: fls. rather large, pink, on slender pedicels; sepals lanceolate; petals oblong, ovary glabrous or slightly glandular, with 1 ovule in each cell. B.R. 30:67. J.H. III. 42:461.

F. TRACY HUBBARD.

TEÙCRIUM (Teucer was the first king of Troy). *Labiàtæ*. GERMANDER. Herbs, subshrubs, or shrubs, some of which are greenhouse plants or outdoors in the extreme South, others of them hardy in the North and suitable for the wild-garden or rockwork.

Leaves entire, dentate or incised, sometimes many-cleft; floral lvs. similar or reduced to bracts: floral whorls 2-fld., rarely many-fld., arranged in racemose spikes or terminal heads, rarely with the fls. in a terminal spike or irregularly whorled; calyx tubular or campanulate, rarely inflated, 10-nerved, 5-toothed; corolla-tube included or rarely exserted, limb as if 1-lipped, lower lip large, upper very small or split so as to appear to be wanting; stamens 4, in 2 pairs, exserted through the split notch in the short upper lip: nutlets obovoid, reticulate, rugose.—About 160 species, widely distributed through the warmer and temperate regions of the world. Monographed by Bentham in De Candolle's Prodromus Systematis Naturalis, Vol. 12 (1848). The specific descriptions in the present article are largely based on this work but the sequence of sections and species is according to Briquet in Engler and Prantl, Pflanzenfamilien VI. 3*a*.

The teuciums are little known in cultivation. They probably present no special difficulties to the gardener.

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KEY TO THE SPECIES.

A. *Floral whorls condensed into a terminal subglobose head.*
  B. *Lvs. entire* ..... 1. **montanum**
BB. *Lvs. crenate.*
  C. *Blades oblong or oblong-linear* .... 2. **Polium**
  CC. *Blades rotundate* ..... 3. **pyrenaicum**
AA. *Floral whorls not condensed into a terminal head.*
  B. *Calyx erect.*
    C. *Lvs. entire or the lower somewhat dentate* ..... 11. **fruticans**
    CC. *Lvs. incise-dentate or dissected.*
      D. *Pedicels shorter than the floral lvs* ..... 9. **bicolor**
      DD. *Pedicels much longer than the floral lvs* ..... 10. **orientale**
  BB. *Calyx declinate.*

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CXI. Syringa (lilac), Madame Lemoine.

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c. *Fls. not in regular floral whorls, usually in a dense simple spike, sometimes somewhat whorled.*
d. *Calyx with the upper teeth slightly broader than the lower.* 7. **canadense**
dd. *Calyx with the uppermost tooth much broader* ..... 8. **hircanicum**
cc. *Fls. in regular floral whorls.*
d. *Floral whorls 2–6-fld.: small shrubs or subshrubs erect or procumbent at base.*
e. *Lvs. crenate or incised-dentate.* 4. **Chamædrys**
ee. *Lvs. entire or acutely few-toothed at apex* ..... 5. **Marum**
dd. *Floral whorls 2-fld.*
e. *Species perennial herbs* ..... 6. **Scorodonia**
ee. *Species hoary shrubs* .....12. **betonicum**

Section I. Polium.

1. **montànum,** Linn. Low subshrub, prostrate, hoary or pubescent: sts. much branched at base, summit shortly ascending or rarely suberect and 2–4 in. high: lvs. oblong-linear, entire, base narrowed to a very short petiole, beneath or both surfaces hoary: floral whorls few, condensed into a terminal head, which is hemispherical: fls. white becoming yellow; calyx tubular-campanulate, glabrous or hoary, teeth lanceolate, subulate-acuminate. S. Eu. and Orient.

2. **Pòlium,** Linn. Low canescent-tomentose, lanate or rarely pilose-hispid shrubs, 2–6, rarely 12 in. high: basal branches procumbent, ascending or rarely suberect: lvs. cuneate-oblong or linear, sessile, crenate, margin revolute, upper surface very short-tomentose, densely lanate or pilose, color, especially above, yellowish hoary, golden or rarely green; floral lvs. similar: floral whorls few, 2–6-fld., condensed in a globose or oblong head, which is solitary or often several corymbosely glomerate: fls. white, yellow, or purple; calyx tubular-campanulate; corolla small. Medit. region and Orient.—A decidedly variable species. Var. **flavéscens,** Benth. (*T. aùreum,* Schreb.), has broader lvs., very hairy heads and yellow tips to the branches.

3. **pyrenàicum,** Linn. Perennial, repent or diffusely much branched, villous, sterile branches whip-like, fertile short-ascending: lvs. petioled, rotundate, 4–8 lines diam., crenate, base truncate, rounded or cuneate, both surfaces green and hirsute, especially near the margins and nerves; floral lvs. petioled, oblong-linear, entire, acute: floral whorls few, condensed in a small terminal head: fls. yellow (or white); calyx campanulate, teeth acuminate-acute; corolla-lobes often purplish at base. Mountains of S. W. Eu.

Section II. Chamædrys.

4. **Chamædrys,** Linn. Perennial or shrubby, 1–2 ft. high, base decumbent, branching, pubescent or villous: lvs. short-petioled, ovate or oblong, incised-crenate, base cuneate, both surfaces green or canescent beneath; floral lvs. smaller and dentate: floral whorls 2–6-fld., the upper racemose: fls. red-purple or bright rose, with red and white spots, ¾in. long, rather showy; calyx tubular-campanulate, teeth lanceolate, acuminate. Eu.—A good border plant for late summer bloom.

5. **Màrum,** Linn. Shrub, low, very much branched, and hoary: lvs. small, ovate, 2–4 lines long, short-petioled, entire or very rarely crenate, hoary beneath; floral lvs. smaller: floral whorls 2–4-fld., racemose, subsecund, raceme 1–2 in. long, whorls approximate: fls. purplish; calyx hirsute, tubular-campanulate; corolla villous outside. Medit. region.—A low greenhouse shrubby plant similar in habit to *Thymus vulgaris.*

Section III. Scorodonia.

6. **Scorodònia,** Linn. Erect, hispid perennial, 1–2 ft. high, pubescent or subglabrous: lvs. ovate, 1–2 in. long, obtusely crenate, short-petioled, base rounded or cordate, both surfaces green; floral lvs. minute: raceme somewhat branched, rather paniculate above: fls. yellow; calyx rather villous, broadly campanulate; corolla-tube exserted, pubescent outside, the tube twice as long as the calyx. Eu. and adventitious in E. N. Amer.

Section IV. Stachybothys.

7. **canadénse,** Linn. Erect, perennial herb, 1–3 ft. high, soft-pubescent or canescent: lvs. ovate-lanceolate to oblong-ovate, 2–3 in. long, serrate, base rounded, somewhat canescent beneath, short-petioled; floral lvs. bract-like, sessile, lanceolate: spikes 2–6 in. long, rather lax, simple: fls. purple to cream-color; calyx short-pedicelled, campanulate, hoary and somewhat villous; corolla-lip elongated. Low ground, Maine to Brit. Col., southward to Pa., Ohio, Mo., New Mex., and Calif.—Useful for low grounds and moist borders.

8. **hircánicum,** Linn.; also spelled *hyrcanicum.* Erect perennial herb 1–2 ft. high, slightly branched, pubescent: lvs. ovate-cordate, 1–3 in. long, obtuse, coarsely crenate, base deeply cordate, scarcely pubescent above, softly somewhat canescent beneath; floral lvs. as subulate bracts: spike simple, 3–8 in. long, dense: fls. purple or red; calyx 2-lipped; corolla villous outside. Caucasus and Persia.

Section V. Teucris.

9. **bícolor,** Smith. Dwarf, herbaceous, glabrous: lvs. ovate, oblong or lanceolate, about 1 in. long, obtuse, entire or incised, both surfaces green; floral lvs. usually exceeding the fls.: peduncles axillary, 1-fld., short, upper subracemose: fls. blue and white; calyx broadly campanulate, green, teeth broad-lanceolate, acute; corolla-tube included. Peru and Chile.—Offered in Calif. at one time, but apparently not successful.

10. **orientàle,** Linn. Erect perennial herb, about 1 ft. high, branched at base, green and glabrous or pubescent, canescent: lvs. 1–2-pinnatisect, lower 1½–2 in. long, segms. linear, entire or incised, both surfaces pale or green; upper lvs. smaller; floral lvs. minute: peduncles laxly racemose, irregularly 1–3-fld.; pedicels much longer than floral lvs.: fls. violet or blue; calyx campanulate, teeth lanceolate; corolla 3 times longer than calyx. Caucasus and Asia Minor.

11. **frùticans,** Linn. Shrub 2–3 ft. high, divaricate branching: lvs. ovate, entire, obtuse, glabrous above, white or reddish brown, tomentose beneath, petioled; floral lvs. similar, smaller: racemes terminal or lateral on short branches, few-fld.; peduncles 1-fld., shorter than the calyx: fls. blue; calyx campanulate, tomentose; corolla-lip twice longer than the calyx. Eu.—Recommended for dry places S. It has a long blooming season.

Section VI. Teucriopsis.

12. **betónicum,** L'Her. Shrub 2–3 ft. high: branches hoary-tomentose: lvs. ovate-oblong, 1–1½ in. long, rather long-petioled, hoary beneath or on both sides; floral lvs. usually lanceolate: floral whorls 2-fld., secund, laxly racemose, raceme 3–6 in. long: fls. purple; calyx campanulate; corolla-tube somewhat exserted, pubescent outside, upper lobes of limb forming an obsolete upper lip, lateral lobes small, oblong, lowest oblong, concave. Madeira. R.H. 1912, p. 465.

T. frutéscens, Hort., is offered in the trade as a shrub for the rockery, with downy foliage and heads of pale blue fls.; not known botanically; possibly it is an error for T. fruticans.

F. Tracy Hubbard.

TEYSMÁNNIA (named for J. E. Teysmann). *Palmàceæ.* Low unarmed palm, grown in the warmhouse: caudex underground: lvs. erect, elongate-rhomboid obtuse, base acute, margin laciniate, divisions 2-cleft: spadix rather short, branches divided at base, reflexed above; spathes papery-leathery: fls. hermaphrodite,

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minute; calyx cup-shaped, 3-toothed; petals thick; stamens 6; ovary of 3 carpels, rarely 1 or 2, free or slightly coherent: fr. globose or depressed-globose, 1-celled, 1-seeded. One species, Sumatra. *T. altifrons*, Reichb. f. & Zoll. Lvs. 6–7 x 1½ ft., folded; petioles carinate dorsally, obsoletely concave in front, the angles rounded and uncinate-prickly: spathes sheathing the tomentose peduncle: fr. as large as an apple. Sumatra.

THÀLIA (named after Johann Thalius, a German naturalist; died 1588). *Marantàceæ*. Perennial marsh or aquatic herbs, some of them hardy, others suitable for the warm- or greenhouse.

Leaves few, large, long-petioled, often canna-like: panicles terminal; fls. in pairs along the branches forming lax spikes, the pairs in a 2-valved spathe; sepals 3, free, equal, membranaceous; petals 3, free or very shortly connate; lobes of the androœcium petaloid, very irregular; lip broad, crested within; anthers 1-celled; ovary 1-celled, 1-ovuled, stigma 2-lipped: caps. oblong-ovoid or globose.—Schumann (Das Pflanzenreich, hft. 11) accepts 7 species, in Trop. and warm Temp. America.

A. *Plant covered with a white powder.*

dealbàta, Fras. Stemless: petioles 1–2 ft. long: lvs. canna-like, cordate, ovate, 6–9 in. long: scape terete, 3–5 ft. high: panicles erect: spikes erect. June–Sept. Ponds and marshes, S. C. and west. B.M. 1690. G.W. 3, p. 620. B.B. 1:455.—A stately aquatic; should be placed in shallow water or in wet soil.

AA. *Plant not powdery.*

geniculàta, Linn. (*T. divaricàta*, Chapm.). Stemless: petioles longer than in *T. dealbata:* lvs. banana-like, 1–3 ft. long, oblong-ovate: scape 5–10 ft. high: panicles 2–4 ft. wide: spikes zigzag, pendulous. Sept., Oct. Ponds, Fla.—This native ornamental-lvd. marsh-plant thrives in garden soil with cannas and like plants. Does well under cultivation in S. Calif.

T. sanguínea, Lem.=Stromanthe sanguinea.

F. Tracy Hubbard.†

THALÍCTRUM (ancient name of doubtful origin; perhaps ultimately from Greek *thallo*, to grow green). *Ranunculàceæ*. Meadow Rue. Interesting plants for the herbaceous border and wild-garden, with fern-like foliage and small flowers in panicles or terminal clusters.

Erect perennial herbs: lvs. ternately compound and decompound; st.-lvs. alternate: fls. dicœcious, polygamous, or perfect in some species, rather small, generally greenish white or sometimes purple or yellow, borne in a panicle or loose raceme; sepals 4 or 5, deciduous; petals wanting; stamens many, showy: carpels usually few, 1-seeded. A monograph of the entire genus was published in 1885, by Lecoyer, in Bull. Soc. Roy. de Bot. de Belge, where he describes 69 species. In 1886 Trelease published a treatment of "North American Species of Thalictrum" in Proc. Soc. Bost. Nat. Hist. 23:293–304, in which he recognized 11 species and 4 varieties north of Mex. His treatment is rather closely followed by Robinson in Gray's Syn. Flora, 1895. All N. American forms were treated by K. C. Davis in Minn. Bot. Studies, Aug., 1900. See also recent studies by E. L. Greene. About 80–90 species are now known, widely distributed in temperate regions, a few in the tropics.

3789. Thalictrum aquilegifolium. (×¼)

Many thalictrums are very hardy, and only the more southern forms of those given below are at all tender. These plants are valued for their feathery heads of flowers, contrasting with their handsome stems and leaves, which are often of a purple cast. They are neat and attractive subjects, often conspicuous in the wild but not so much planted as they deserve. The spring-flowering species are mostly inhabitants of woods and groves, and the summer-flowering of low open grounds and swales, but they do well under garden conditions. The early ones are small and delicate plants, and the late ones are tall and often commanding. The tassel-like staminate inflorescence of some species is very attractive. Thalictrums may be propagated by seed, or by division of roots in early spring just as growth begins. The division of the roots is more popular than the seed method, as it produces strong plants much earlier. Seed is scarce in some species. Any good loamy soil will suit them, if well drained.

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A. *Fr. strongly angled and 2–3-winged, usually stipitate.*

1. **aquilegifòlium,** Linn. Feathered Columbine. Fig. 3789. Sts. large, hollow, 1–3 ft. high, glaucous: lvs. once or twice 3–5-parted; lfts. stalked or the lateral ones nearly sessile, slightly lobed or obtusely toothed, smooth, suborbicular: fls. in a corymbose panicle, dicœcious; sepals white; stamens purple or white: fr. 3-angled, winged at the angles. May–July. Eu., N. Asia. B.M. 1818; 2025 (as var. *formosum*). Gn. 47, p. 357; 50, p. 117. A.F. 16:1234. J.H. III. 50:203. Gn.W. 23:676 (var. *atropurpureum*). G.L. 23:249 (var. *atropurpureum*). G. 32:623 (var. *album*). G.C. III. 47:211 (var. *album*).—A good garden plant and frequently planted; fls. in early summer. The old name *T. Cornùti*, Linn., may be a synonym of this, and if so it is the older name, being published on a preceding page, but *T. Cornuti* was described as an American plant, while *T. aquilegifolium* is not. As the description and old figure of *T. Cornuti* do not agree with any American plant, the name may well be dropped. Plants advertised as *T. Cornuti* are probably *T. aquilegifolium* or *T. polygamum*.

2. **dipterocárpum,** Franch. Very smooth, rhizome short: st. simple, 2 ft. or more high, angled above: lower and middle lvs. broadly triangular, 4–6 in. broad, thrice ternately cut; lfts. subrotund, base slightly cordate, pale greenish above, glaucous beneath; cauline lvs. much smaller: panicle narrowly pyramidal: fls. rose, rather large; sepals ovate-lanceolate, long-acuminate: achenes subsessile, compressed, obovate, perceptibly inequilateral, marked on the faces with 3 fuscous nerves, each side rather broadly winged; wings membranaceous, white. Yunnan, China. G.C. III. 45: suppl. Aug. 3. G. 33:111; 36:277. G.M. 51:661. Gn. 72, p. 435. J.H. III. 64:95.—An excellent plant, much noticed abroad.

3. **Chélidonii,** DC. Dwarf and much branched: lvs. biternate, glaucous beneath and pale green above; lfts. about 1 in. across, orbicular-cordate, crenate or lobed: fls. 1 in. across, lilac or purple, in a rigid-branched panicle, the pedicels deflexing in fr.; sepals elliptic and

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obtuse: achenes many, long-stalked, reticulate, with an incurved style. Himalayas, 8,000–12,000 ft. G.C. III. 28:167.—A handsome plant.

4. **Delavàyi,** Franch. Slender, 2–3 ft. high, glabrous: lower lvs. on long, slender petioles, 2–3 times 3–5-parted; lfts. long-stalked, 3–5-lobed, base cuneate, rounded or cordate: fls. pendulous, dicœcious; sepals purple or lilac, ½in. long, equaling the slender stamens; anthers linear: carpels 10–12: fr. winged at the 3 angles, stipitate. Summer. Mountains of E. China. B.M. 7152. G.C. III. 8:125; 38:450. G. 35:793.

AA. *Fr. striate edged or ribbed rather than winged, sessile or essentially so in most species.*

B. *Fls. probably perfect.*

C. *Filaments widened near the anthers, the latter ovate and obtuse.*

D. *Achenes sessile in a head, ovate-oblong.*

5. **petaloìdeum,** Linn. St. round, nearly 1 ft. high, almost naked: lvs. 3–5-parted; lfts. smooth, ovate, entire or 3-lobed: fls. corymbose, perfect; sepals white, rotund; filaments pink; anthers yellow: fr. ovate-oblong, striated, sessile. June, July. N. Asia. L.B.C. 9:891. G. 28:625.

DD. *Achenes somewhat stalked, widely spreading, straight on the dorsal margin.*

6. **sparsifiòrum,** Turcz. St. erect, sulcate, 2–4 ft. high, branching, usually glabrous: lvs. triternate, upper ones sessile; lfts. short-stalked, round or ovate, variable in size and shape of base, round-lobed or toothed: fls. in leafy panicles on slender pedicels, perfect; sepals obovate, whitish, soon reflexed; filaments somewhat widened; anthers very short: achenes short-stalked, obliquely obovate, flattened, dorsal margin straight, 8–10-nerved; styles persistent. N. Asia, through Alaska to Hudson Bay, in mountains to Colo. and Calif.

CC. *Filaments filiform or at least very slender; anthers linear, acute or mucronate.*

D. *Stigma hastate or spurred.*

7. **alpìnum,** Linn. Sts. smooth, naked or 1-lvd., only 4–8 in. high, from a scaly rootstock: lvs. tufted at the base, twice 3–5-parted; lfts. coriaceous, orbicular or cuneate at the base, lobed, revolute: fls. in a raceme, perfect; sepals greenish, equaling the yellow stamens; stigma linear: achenes small, obliquely obovoid. Northern and Arctic, and alpine regions of both Old and New Worlds. B.M. 2237.

DD. *Stigma not hastate or spurred.*

8. **mìnus,** Linn. (*T. purpùreum,* Schang. *T. saxàtile,* Vill.). Sts. round, sulcate, 1–2 ft. high: lfts. variable, acute or obtusely lobed, often glaucous: fls. drooping, in loose panicles, perfect; sepals yellow or greenish: fr. ovate-oblong, sessile, striated. Summer. Eu., Asia, N. Afr.—A polymorphous species in the variation of the lfts.

Var. **adiantifòlium,** Hort. (*T. adiantoìdes,* Hort. *T. adianthifòlium,* Bess.). Lfts. resembling those of adiantum fern.—A form much used and admired.

9. **Pûrdomii,** J. J. Clark. Much like *T. minus,* but fls. larger, sepals acute or acuminate, the pedicels longer and somewhat capillary: glabrous, the branches reddish green: lvs. 2- or 3-pinnate, about 8 in. long, the pinnæ 3–5 pairs; lfts. ovate, 3-lobed, membranaceous: fls. small, greenish, pendulous, in lax panicles; sepals 4, ovate-lanceolate, 3-nerved, acute or acuminate; stamens about 14: carpels 5, sessile, 8-ribbed. N. China; very recently described; cult. abroad.

10. **flàvum,** Linn. Stout, 2–4 ft., with furrowed st. and creeping stoloniferous rootstock: lvs. large, 2–3-compound; lfts. to 1½ in. long, 3-lobed, obovate or obcuneate: infl. compound and compact, the fls. erect and pale yellow (the anthers bright yellow); sepals small: achenes 6–10, small, 8-ribbed. Eu.

11. **glaûcum,** Desf. (*T. speciòsum,* Hort.). Sts. erect, round, glaucous, 2–5 ft. high: lfts. ovate-orbicular, 3-lobed; lobes deeply toothed: fls. in an erect panicle, perfect; sepals and stamens yellow: frs. 4–6, ovate, striated, sessile. June, July. S. Eu.

BB. *Fls. diœcious or polygamo-diœcious.*

C. *Achene somewhat inflated, obovoid, and short-stalked.*

12. **polycàrpum,** Wats. Aromatic, to 3 ft. high, glabrous throughout: lfts. long-stalked, ovate or roundish, serrate, cut or divided, veined beneath: fls. dicœcious, in rather close panicles; sepals elliptic or ovate; stamens 16–25, with yellowish anthers: achenes larger, in a dense globose head, short-stalked, obovoid, turgid, tapering into reflexed styles. Sandy streams, coast ranges of Calif. to Columbia River.

3790. Thalictrum Fendleri. (×⅓)

CC. *Achene flattened and 2-edged, nearly or quite sessile.*

13. **occidentàle,** Gray. St. to 3½ ft. high, bearing 2 or 3 lvs. which are 2–4-ternate and glandular-pubescent: lfts. thin and glaucescent, with rounded lobes: achenes long, slender, thin-walled, 2-edged, ribbed, not furrowed. Colo., northward and westward.

14. **Féndleri,** Engelm. Fig. 3790. Plant 1–3½ ft. high, rather stout and leafy: lvs. 4–5 times pinnatifid, upper st.-lvs. sessile; lfts. rather firm, ovate to orbicular, usually with many shallow rounded or acuminate lobes; bases variable: fls. dicœcious, in rather compact panicles; stamens many; anthers long: achenes nearly sessile, obliquely ovate, flattened and 1 edge gibbous, 3–4 ribs on each face. July, Aug. S. Colo., westward and southward.

CCC. *Achene ovoid, sessile or nearly so, striate or ribbed.*

D. *Filaments club-shaped or dilated to nearly or quite the width of the anthers.*

15. **polygamum,** Muhl. (*T. Cornùti,* Auth., not Linn.). Tall Meadow Rue. Erect, 3–8 ft. (or more) high, branching and leafy, smooth or pubescent, not glandular: lvs. 3–4 times ternate or terminally pinnate; lfts. oblong to orbicular, bases variable, 3–5 apical lobes: fls. in a long, leafy panicle, polygamo-dicœcious; sepals white; filaments broadened when young; anthers short: achenes ovoid, stipitate, 6–8-winged or -ribbed, with stigmas as long, which become curled. July, Aug. Low or wet grounds, Newfoundland and Canada to Fla., westward to Ohio.

DD. *Filaments very slender, usually filiform.*

16. **dasycàrpum,** Fisch. & Lall. (*T. purpurascèns,* Auth., not Linn.). Stout and erect with purplish st., 3–7 ft. tall, leafy and branching: lvs. 3–4-ternate; lfts. short-oblong and mostly 3-toothed, pubescent beneath but not waxy or glandular: fls. mostly dicœcious but perhaps in some cases polygamous, with purplish

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sepals and filaments: achene ovoid, with 6–8 prominent ribs. N. J. to N. D. and Sask. and far southward.—An attractive plant.

17. **venulòsum,** Trel. (*T. confine,* Fern.). St. simple, erect, 10–20 in. high, glabrous, glaucous, bearing 2–3 long-petioled lvs. above the base: lvs. 3–4 times 3-parted; lfts. short-stalked, rather firm, rounded and lobed at the apex, veiny beneath: fls. in a simple panicle, dicœcious, small; sepals ovate; stamens 10–20, on slender filaments; anthers oblong, slender-pointed: achenes nearly sessile, 2 lines long, ovoid tapering to a straight beak, thick-walled and 2-edged. S. D. westward and southward in the mountains.

18. **dioìcum,** Linn. Rather slender, 1–2 ft. high, glabrous: lvs. 3–4 times 3-parted; lfts. thin, orbicular, several-lobed or revolute, bases variable: fls. in a loose, leafy panicle with slender pedicels, dicœcious; stamens much longer than the greenish sepals; anthers linear, obtuse, exceeding their filaments in length: achenes ovoid, nearly or quite sessile, longer than their styles, with about 10 longitudinal grooves. Early spring. Woods, Lab. to Ala., west to Mo.

For *T. anemonoìdes,* see Syndesmon.—*T. orientàle,* Boiss. Low perennial, st. ½ft. high, flexuose, plant surculose (emitting runners): lvs. triternate; segms. roundish, very obtuse, somewhat 3-lobed: panicle few-fld.; sepals petal-like and persistent, obovate, white, surpassing the stamens; filaments linear: carpels 3–6, linear-oblong, deeply striate, ¼in. long. Asia Minor. Fls. like those of Syndesmon. The plant listed under this name is said to grow 3 ft. high and to have elegant much-divided fern-like glaucous-green lvs. and branching clusters of white fls.—*T. paniculàtum,* Hort., is described as a dwarf (1 ft.) with yellow fls. It probably is not T. paniculatum, Bess.—*T. paniculàtum,* Bess., differs from T. minus in the lfts. being trifid from the ovate base, in the very open panicle and the reddish lf.-segms.: habitat doubtful.—*T. prèstans,* Hort., listed abroad, is said to be a graceful plant 4–5 ft. high, with yellow and mauve fls.—*T. sulfùreum,* Hort., is a hybrid.

K. C. Davis.
L. H. B.†

THAMNÓPTERIS (Greek, *bushy fern*). *Polypodiàceæ.* A generic name for a small group of simple-leaved ferns which cannot properly be separated from Asplenium, to which they are here referred (page 414). One species (and a probable variety) is all that is in common cultivation, viz., *A. Nidus,* the bird's-nest fern. Some authors name it under Neottopteris (which see).

THÁSPIUM (name modified from *Thapsia,* another genus of the same family). *Umbellíferæ.* Meadow Parsnip. Glabrous hardy perennials: lvs. ternately divided: umbels terminal, composite; involucre none: fls. yellowish or purple, polygamous; calyx-teeth conspicuous, deciduous; petals acuminate; disk spread out: fr. ovate or ovate-oblong. About 3 species, N. Amer. **T. aùreum,** Nutt. St. branched, 1½ ft. high: root-lvs. mostly cordate; st.-lvs. ternate; lfts. ovate to lanceolate, serrate: fls. yellow. June, July. Var. **trifoliàtum,** Coult. & Rose, with crenate lvs. or lfts., is a common western form. Var. **atropurpùreum,** Coult. & Rose, fls. dark purple. The species is of easy cult. in any ordinary soil. In the wild state the plant grows in at least partial shade. Well-grown plants, especially of var. *atropurpureum,* make attractive specimens. F. W. Barclay.

THÈA (the latinized Chinese name of the tea plant). *Ternstrœmiàceæ.* Tea. Woody plants; one species grown for its leaves which yield the tea, the others grown for their handsome flowers and foliage.

Evergreen shrubs or small trees: lvs. alternate, short-petioled, serrate: fls. axillary or sometimes terminal, usually solitary, stalked, nodding; sepals 5–7, persistent; petals 5–7, rarely 9, stamens numerous, more or less connate below; ovary 3–5-celled; styles 3–5, filiform, connate below: fr. a dehiscent caps. with 1 large globose or ovoid seed in each cell.—About 14 species in Trop. and Subtrop. Asia. Camellia, differing in its sessile upright fls. with many deciduous sepals, is often united with Thea, but from a horticultural point of view it seems desirable to keep the two separate.

The most important member of the genus is *T. sinensis,* cultivated in nearly all subtropical countries and in the mountainous regions of the tropics for its leaves which yield the well-known tea and are an article of great commercial importance. The other members of the genus are ornamental shrubs occasionally grown for their handsome white or pink flowers and the attractive evergreen foliage. They are but little

3791. Thea sinensis.—Tea plant. (×⅓)

known in this country and require about the same treatment as camellia, which see for culture and propagation.

sinénsis, Linn. (*Camèllia Thèa,* Link. *Camèllia theífera,* Griff.). Tea. Fig. 3791. Shrub, sometimes tree, to 30 ft.: lvs. elliptic-lanceolate or obovate-lanceolate, acuminate, serrate, glabrous, sometimes pubescent beneath, 2–5 in. long: fl. white, fragrant, 1–1½ in. broad; petals usually 5. China, India.—Several varieties have been distinguished, of which the following are the most important: Var. **Bohèa,** Pierre (*T. Bohèa,* Linn.). Lvs. elliptic-oblong, obtuse, flat, dark green, to 3 in. long: fls. usually solitary; sepals pubescent inside or glabrous, ciliate, petals 5–6; styles connate below: branches erect. B.M. 998. L.B.C. 3:226. Var. **víridis,** Pierre (*T. víridis,* Linn.). Lvs. oblong-lanceolate, acutish, often concave, light green, to 5 in. long: fls. 1–4; sepals pubescent, ciliate; petals 5–9; styles free: branches spreading. B.M. 3148. L.B.C. 3:227; 19:1828. Var. **cantoniénsis,** Pierre (*T. cantoniénsis,* Lour.). Lvs. oblong-lanceolate: fls. usually terminal, solitary; sepals pubescent inside; petals 7–9; styles free only near the apex. Var. **assámica,** Pierre (*T. assámica,* Mast.). Lvs. oblong-lanceolate, acuminate: fls. 1–4; sepals glabrous inside; petals 7–9; styles free only at the apex.—The black tea, however, and green tea of commerce are not derived from certain varieties, but are the result of different treatment of the lvs. after gathering. For the cult. of tea in N. Amer., see Vol. II, Cyclo. of Amer. Agric.

T. cuspidàta, Kochs (Camellia cuspidata, Hort.). Shrub, to 6 ft.: lvs. elliptic to lanceolate, thick, long-acuminate, indistinctly denticulate, glabrous, 2–3 in. long: fls. solitary, white, 1½ in. across.; petals 6; ovary glabrous. China. G.C. III. 51:261. J.H.S. 38, p. 62, fig. 38.—*T. drupífera,* Pierre=Camellia drupifera.—*T. euryoìdes,* Booth (Camellia euryoides, Lindl.). Shrub, to 4 ft.: lvs. ovate-lanceolate, silky beneath: fls. white, nodding, axillary, rather small. B.R. 983. L.B.C. 15:1493.—*T. hongkongénsis,* Pierre=Camellia hongkongensis.—*T. maliflòra,* Seem. (Camellia rosæflora, Hook.). Shrub: young branchlets pubescent: lvs. ovate, acuminate, 2–3 in. long: fls. pink; petals, 5, obcordate; ovary glabrous. China. B.M. 5044. Var. *plèna* (Camellia maliflora, Lindl.). Fls. double, pink.

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B.R. 547. L.B.C. 12:1134. B.M. 2080.—*T. reticulàta*, Pierre=Camellia reticulata.—*T. rosæflòra*, Kuntze=T. maliflora, Seem.—*T. Sasánqua*, Nois.=Camellia Sasanqua. ALFRED REHDER.

THECOSTÈLE (Greek, *receptacle* and *column*, in allusion to the shape of the gynostegium, the sheath or covering enveloping the female elements). *Orchidàceæ*. Epiphytic herbs adapted to the warmhouse. Pseudobulbs fleshy, ribbed, 1-lvd.: lvs. oblong, leathery: scape recurved from the side of the pseudobulbs, bearing a simple raceme: fls. medium-sized, short-pedicelled; sepals equal, free, spreading rather broad; petals linear; labellum connate at base with the column in a broad tube, lateral lobes erect, falcate, almost curled, midlobe spreading, elongate, sinuate, undivided; column apex appendiculate with 2 falcate wings at the side of the stigma; pollinia 2: caps. ovoid, beakless.—About 5 species, Malaya.

Zóllingeri, Reichb. f. Pseudobulbs the size of a nutmeg or narrower: lf. 5–9 in. long, oblong or linear-oblong: scape with the raceme 5–8 in. long: fls. ⅜in. diam.; sepals and narrowly linear petals white, blotched with brick-red or crimson; lip yellowish with a pink pubescent front, side lobes subclavate, sigmoid, midlobe broadly obcordate. Lower Burma and Malay Archipelago. F. TRACY HUBBARD.

THELESPÉRMA (Greek, *wart, seed;* the seeds are often papillose). *Compósitæ*. Glabrous herbs or subshrubs grown in the warmhouse or greenhouse, and sometimes planted out-of-doors.

Leaves opposite or the upper alternate, linear, often filiform, simply or twice pinnately parted or the upper not divided: head medium-sized, long-peduncled, heterogamous; ray-fls. yellow, in 1 row, neutral; disk-fls. purplish, fertile; involucre in 2 rows, the inner row of bracts campanulate and connate to the middle or more: achenes glabrous, smooth or tuberculate.—About 15 species, Mex. and extra-Trop. S. Amer. The genus may be separated from Coreopsis by the form of the involucre, which is in 2 series of bracts with the inner series united to about the middle into a cup, while in Coreopsis the 2 series are distinct and united only at the very base. The seeds, especially the outer ones of the head, in Thelesperma are often tuberculate.

trífidum, Brit. (*T. filifòlium*, Gray). Annual or biennial, 1–2½ ft. high, loosely branching: lvs. twice-pinnate, lobes filiform, outer involucral bracts subulate-linear: rays somewhat spatulate, 3-lobed, disk purple or brown. S. D., Mo., and Neb. to Colo., Texas, New Mex., and N. Mex. B.B. (ed. 2) 3:500.—Probably rare in cult.

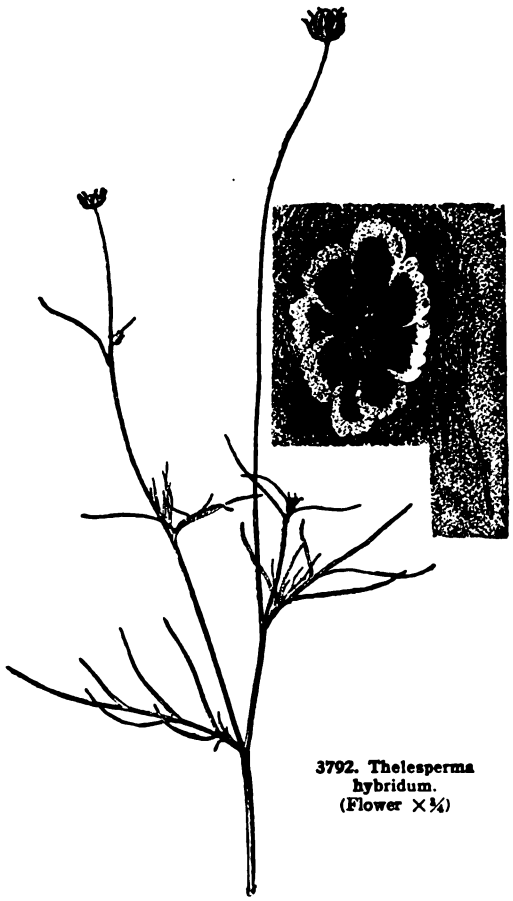
hýbridum, Voss (*Cosmídium Burridgeànum*, Hort.). Fig. 3792. A hardy annual, 1½ ft. high, a hybrid of *T. trifidum* and *Coreopsis tinctoria*, from the latter of which it acquires the brown-purple color of its rays: lvs. bipinnately divided into filiform lobes not wider than the st. This is probably *Coreopsis atropurpurea*, Hort. F. TRACY HUBBARD.†

THELYMÌTRA (Greek, *woman* and *cap*, alluding to the hood-shaped column). *Orchidàceæ*. Terrestrial herbs with ovoid tubers, occasionally grown in the greenhouse. Lf. solitary, usually with a rather long sheath, linear, lanceolate or rarely nearly ovate: fls. usually several in a terminal raceme, sometimes reduced to 1 or 2, blue, purple, red, or yellow, occasionally with white varieties; sepals and petals nearly equal, spreading; labellum similar; column erect, broadly winged, the wings variable, sometimes extended into a broad lobed hood over the anther, lateral lobes often penicillate or crested: caps. erect, obovoid or oblong, beakless. About 30 species, Austral., New Zeal., New Caledonia, and Malaya. Cult. similar to that of bletia. None of the species is in common cult., but a number of them are of interest to orchid fanciers.

T. cárnea, R. Br. St. slender, often flexuous, 6–12 in. high: lvs. narrow-linear: fls. 1–3, pink, sepals and petals oval-elliptic, oblong or obtuse, about 4 lines long. Austral.—*T. iridoides*, Sw. St. usually more than 1 ft. high: lvs. long-linear or linear-lanceolate, flat or channeled, with 1 or 2 shorter ones: fls. blue, pedicellate, usually forming a raceme 4–6 in. long; sepals, petals, and lip elliptic-oblong, 9–10 lines long. Austral.—*T. longifòlia*, Forst. (T. Forsteri, Sw., T. graminea, Lindl. T, pauciflora, R. Br.). Usually about 1 ft. high: lvs. long and narrow: fls. blue, lilac, or pink, rather large, several to a raceme, column produced into a broad hood, usually conspicuous from its dark color. Austral.—*T. variegàta*, Lindl. St. not very stout, 1 ft. or more high: lvs. with a villous sheath, blade linear, glabrous, with a much dilated base: fls. 2–4, purple, large; sepals and petals lanceolate, shortly acuminate or acute, ¾–1 in. long, variegated. Austral.—*T. venòsa*, R. Br. St. 1–2 ft. high: lvs. long and narrow: fls. blue, 6–10; sepals and petals ½–¾in. long; column broadly winged. Austral. F. TRACY HUBBARD.

THEOBRÒMA (Greek, *food of the gods*). *Sterculiàceæ*. Here belong the trees that produce the seed from which chocolate and cocoa are derived.

About a score of small trees in Trop. Amer., with large simple thick and strongly nerved entire lvs., and small fls. which in at least some species are borne laterally on the branches rather than in axils: calyx deeply



3792. Thelesperma hybridum. (Flower ×¼)

5-parted or -lobed; petals 5, mostly clawed or narrowed below; fertile stamens 5, opposite the sepals; ovary sessile and 5-celled, many-ovuled, the style filiform: fr. a large woody drupe or pod, with seeds imbedded in the pulp. The species of prime economic importance is *T. Cacao*, but other species are probably concerned in the production of cocoa, and the natural history of the group is yet confused. The word "cacao" (pronounced *ka-kow'*) is the name of the plant and the unmanufactured product of it; "cocoa" is the manufactured product, produced from the bean-like seeds, chocolate being the chief commercial commodity. (Coco is a

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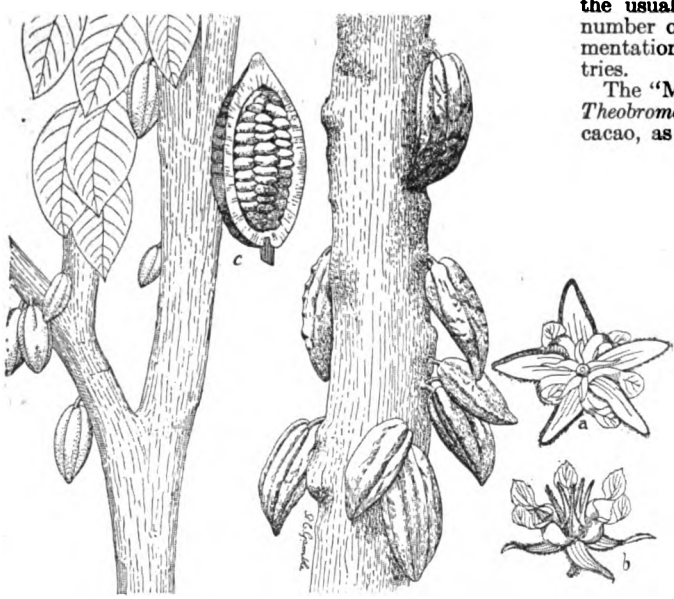
very different plant: see *Erythroxylon*.) The beans are washed or fermented, or both, to remove the mucilaginous substance with which they are surrounded or coated with clay to make them moisture-proof, to prevent decay, and preserve the aroma.

The common cacao is *T. Cacào*, Linn., native apparently in Cent. and S. Amer. It is a wide-branching evergreen tree, reaching 20–25 ft. in height (or somewhat more in the wild), with pubescent twigs and alternate oblong-oval or elliptic-oblong entire short-petioled lvs., the blade 6 in. long more or less, rounded at base and abruptly acuminate at apex, with strong midrib and paired or somewhat alternate arching side veins: fls. small, in fascicles directly on the bark of the trunk and main branches, about ¾in. across when expanded, on slender pedicels ½in. or more long; calyx rose-colored, with acuminate segms.; corolla yellowish, the long petals with a stalk-like claw and expanded blade: fr. or "pod" 1 ft. or less long and mostly 4 in. or less in diam., about 10-ribbed, red, yellow, purplish, or brown, elliptic-ovoid in form, the rind thick, hard, and leathery; cells 5, each with 5–12 "beans" in a row imbedded in a white or pinkish acid pulp; the pods will average about 20–40 good beans; these flat brown or purple beans or seeds, each an inch or more across, constitute the commercial cacao, from which the products are manufactured. For an account of the cult. of cacao, see Cyclo. Amer. Agric., Vol. II, pp. 224–6. There is a large literature on the subject.



3793. Theobroma Cacao, chief source of chocolate. *a*, *b*, flowers, enlarged; *c*, fruit, much reduced.

The estates devoted to the culture of the plant are usually known as "cacao plantations" and are largely on the increase in all suitable climates, owing to the increased demand for the manufactured article in the different forms in which it is now prepared for consumption. The larger proportion of commercial cacao is produced by *Theobroma Cacao* (Fig. 3793). Other species native to Central America and the West Indies are *T. pentagona*, *T. speciosa*, *T. angustifolia*, and the closely related *Tribroma bicolor*.

In vigor of growth and productive capacity, *Theobroma pentagona* resembles to a very large degree the generally cultivated varieties of *T. Cacao*, but it differs in the flowers, in the size of the beans, and especially in the shape of the pods. The beans are larger in size than those of *T. Cacao*, fully equal if not superior in flavor, and are capable of being worked up in the same way as the commoner species. This kind is known on the mainland as "Alligator" cacao, from the fancied resemblance of its skin to the hide of an alligator. The outside of the pod is soft and easily broken, and does not afford such good protection to the interior as the harder shell possessed by *T. Cacao*. In Nicaragua, *T. Cacao* and *T. pentagona* are grown together, and the produce is mostly a mixture of the two species. From the presence of *T. pentagona*, it is possible that hybridization has taken place between two species. It has been noted that the pods of *T. Cacao* produce much larger seeds or beans in Nicaragua than in countries where this species is not grown in company with *T. pentagona:* and the beans of the two species are almost impossible to distinguish when cured together. The product of Nicaraguan plantations also requires much less time for fermentation than the produce of Grenada, Trinidad, or Venezuela, some forty-eight hours being the usual period, while more than four times that number of hours will be required for the proper fermentation of the produce of the last-mentioned countries.

The "Monkey cacao" of the mainland is produced by *Theobroma speciosa*. This is never made into market cacao, as it is very inferior in quality and has a disagreeable flavor. The pods are hard, much corrugated, warted, and of a dirty brown color when ripe.

Many names have arisen for the varieties of *Theobroma Cacao* which are in cultivation, as many as forty having been listed by a Trinidad cultivator of large experience. Looking at the matter from a practical point of view, all these are merely strains of the one species, produced by natural cross-fertilization of the older types. According to Hart's "Cacao," Trinidad, 1900, there are but three major strains or classes of *T. Cacao*, respectively, "Criollo," "Forastero," and "Calabacillo." The type of the first is found indigenous in Trinidad and various places on the mainland, its distinctive character being its bottle-necked pod, with a thin skin and finely ribbed exterior, together with its white or whitish seeds or beans, which are mild in flavor and somewhat rounded in form.

The characters of "Forastero" are its roughly corrugated or verrucose pod, containing large flattish seeds of a purplish color. It is a tree having greater vitality than "Criollo," and gives a much larger crop. "Forastero" means foreign, and this type is said to have been found on the mainland of South America, whence it was imported to Trinidad by Arragonese Capuchin Fathers about 1757. (De Verteuil, "History of Trinidad," 1884.)

"Calabacillo" is the third form, its chief characteristics being the vigor of its growth and its small flat and strongly flavored bean. By some it is considered as a degraded form of Forastero.

While the above gives a brief sketch of the chief characters of the principal types, it must be understood that there are varieties intermediate between the forms; in fact, on the larger number of estates it is impossible to find any two trees exactly alike in all their botanical characters, occurring, without doubt, from the uninterrupted cross-fertilization which has taken place. Still, each country appears to maintain certain characters more permanent than others, and thus secures for itself a name upon the markets of the world. It is probable that this is due, in a measure, to the unconscious preference taken by some to distinctive features of the produce by the continuous cultivation of a fairly

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fixed strain which has arisen. It may also be due in some measure to the influence of climate and environment. Certain it is, however, that there are today strains of cacao which are possessed of distinctive characters, not readily produced by any process of preparation in places other than that in which they are grown. A fine set of illustrations of varieties common to different countries has been published in a work by Paul Preuss, who traveled in cacao-producing countries on behalf of the German government.

These different brands are bought by manufacturers and blended to suit their particular market, but there are certain kinds possessing special flavor which are readily sold at high prices. The value of the commercial product fluctuates and the price has marked variations due to many causes. Whether this results from increased production or from a deterioration in the quality cannot be ascertained. It is clear that if cultivators grow cacao for seed without regard to the best rules of selection, the quality must deteriorate. What mitigates this fact is that all the cacao world has, up to a recent date, followed the same practice. The process of grafting, to which the cacao tree readily submits, as has been proved in Trinidad, will enable operators to make large fields of the choicer varieties, and it may confidently be expected that in a few years a great improvement will be shown in the various grades placed upon the market. (For a recent account of budding, see Wester, Philippine Agric. Rev., 1914, p. 27.) But little cacao is manufactured in the countries where it is grown.

Chocolate is the term used for sweetened and hardened preparations of the roasted and ground cacao bean, with the larger proportion of the original fat retained, while the so-called "cocoa" preparations are the same material in fine powder, sweetened or unsweetened, but with the greater proportion of the cacao fat extracted. This fat, when clarified, is a pure white substance, almost as hard as beeswax, and is used in many pharmaceutical preparations. Chocolate and cocoa are both made from the beans or seeds of *Theobroma Cacao* and *T. pentagona*, and differ only in the method of preparation.

The word "cocoa" is a market corruption of the original Spanish "Cacao," which was adopted by Tournefort as a generic name but has since been displaced by the Linnæan Theobroma.

The plant known as *Theobroma bicolor* has recently been made the type of a new genus (*Tribroma bicolor*, Cook) on account of distinctly different habits of fruiting and flowering and structural differences in the flower (O. F. Cook, Journ. Wash. Acad. 5:287–289, 1915). The leaves are large, and in the juvenile stages of growth are broadly cordate in form, and assume the mature or oblong form only on reaching the third or fourth year's growth. The pods are oval, ribbed and netted, hard and woody, with an outer shell ½ inch in thickness which can be cut only with a saw. The seeds are oval, much flattened, with a dark, hard, and smooth exterior. The interior is white, and has a somewhat nutty flavor. They are used in sweetmeats in the same way as almonds, but cannot be made into commercial cacao, suitable for the manufacture of chocolates. This species is very widely distinct from any of the varieties of *T. Cacao* which produce commercial cacao. The produce of *T. bicolor* is known in some parts of Central America by the names of "Wariba," "Tiger," and "Patashte" cacao. See also Cont. Nat. Herb., vol. 17, pt. 8, for branching and flowering habits of cacao and patashte.

J. H. Hart.
L. H. B.†

THEODÒREA (probably a personal name). *Orchidàceæ*. One Brazilian orchid, *T. gomezoìdes*, Rodr., of botanical interest but very little known in cult. By some it is referred to Gomezia. Rolfe describes it as having "the general habit of some small slender oncidium, about 5–6 in. high, but the fls. are borne in slender arching racemes of about 6–12 each. The sepals and petals are subconnivent, lanceolate, acute, 4–5 lines long, and light green in color, with a broad dark brown line toward the base. The lip is oblong-ovate, acute, somewhat reflexed at the apex, and white, with an orange-buff blotch in the center. It appears to be a free-growing little plant, and its appearance in cult. is interesting."

THEOPHRÁSTA (named for Theophrastus, a Greek naturalist and philosopher, 370–285 B.C.). *Myrsinàceæ;* by Mez separated in the family *Theophrastàceæ*. Glabrous shrubs, adapted to the warmhouse.

Stem stout, erect, rather simple: lvs. somewhat terminally clustered, spreading, very short-petioled, linear-oblong, spinose-dentate, netted-veined: fls. hermaphrodite, rather large, in short many-fld. racemes, white; calyx 5-parted, segms. ovate; corolla cylindrical-campanulate, 5-lobed at the top, lobes rotundate; stamens 5, staminodes 5; ovary ovoid: fr. globular, apple-shaped, fleshy, many-seeded.—Two species according to Mez, Pflanzenreich, hft. 15 (IV. 236*a*). W. Indies. The chief technical differences between Theophrasta and Clavija are in the fls. and frs. In Theophrasta the corolla is cylindrical and shallowly 5-lobed; staminodia attached on the base of the corolla: fr. large and many-seeded. In Clavija the corolla is subrotate and deeply 5-cleft; staminodia attached on the tube of the corolla; fr. 1- to many-seeded. See *Clavija*.

Jussièui, Lindl. (*T. densiflòra*, Decne.). Small slender tree, 4–8 ft. high, trunk spiny, 1 in. thick: lvs. large, elongate, linear-lanceolate, gradually narrowed toward the base, about 1½ ft. long, margin sinuate-serrulate, serrulations spinulose, both surfaces lepidote-punctate: infl. many-fld., tomentose with chestnut-brown hairs: fls. white; sepals narrowly rotundate or acutish at apex; corolla fleshy; staminodes dark brown, papillose. Haiti and Santo Domingo. B.M. 4239.

americàna, Linn. (*T. fúsca*, Decne.). Subshrub 1–3 ft. high: st. simple, with ash-gray bark: lvs. elongate, linear-lanceolate, gradually narrowed toward the base, 18–20 in. long, about 2 in. wide, margin with small teeth: infl. many-fld., very densely cylindrical raceme, fuscous-tomentose: fls. dull brown, becoming black; sepals rotundate at apex; corolla urceolate; staminodes slightly emarginate, pulvinate-fleshy. Haiti and Santo Domingo.—Probably rare in cult.

T. imperiàlis, Lind.=Martiusella imperialis.—*T. latifòlia*, Willd.=Clavija latifolia.—*T. longifòlia*, Jacq.=Clavija longifolia.—*T. macrophýlla*, Lind., not Link=Clavija grandis.—*T. minor*, Lind., is offered in the trade; it is some species of Clavija.

F. Tracy Hubbard.†

THERMÓPSIS (Greek, *lupin* and *like*). *Leguminòsæ*. Hardy perennial herbs.

Rhizome usually repent, sending up annual, erect, simple or branched sts., sheathed at their base: lvs. alternate, digitately 3-leafleted; stipules free, lf.-like: fls. rather large, yellow, rarely purple, in terminal racemes or disposed opposite the lvs.; pedicels solitary; calyx narrowly campanulate, teeth or lobes subequal; standard suborbicular; wings oblong; keel equaling or scarcely longer than the wings; stamens free: pod subsessile or short-stipitate, linear-oblong or ovate-inflated, straight or curved.—About 18 species, N. Amer. and N. and E. Asia. They are not particular as to land or position, but do best in a deep light well-drained soil. They are generally deep-rooted plants and endure drought very well. Prop. may be effected by division, especially in *T. montana*, *T. fabacea*, and *T. rhombifolia*, which spread extensively by the root, but in general the better way is by seed, although the seed is rather slow to germinate and should be sown as soon as ripe or in the spring with some heat.

A. *Pod strongly recurved.*

rhombifòlia, Richards. Plant about 1 ft. high, branched: lfts. usually oval or obovate, ½–1 in. long:

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fls. in a compact spike: pod glabrous. June, July. Western states. B.B. 2:265.

lanceolàta, R. Br. (*Podalýria lupinoìdes,* Willd.). Sts. 6–12 in. high: lvs. nearly sessile, the lower and uppermost ones often simple; lfts. oblong-lanceolate, silky-puberulent on both surfaces; stipules lanceolate, half as long as lfts.: fls. geminate or somewhat verticillate, bright yellow. Siberia and Alaska. B.M. 1389.

AA. *Pod straight or only slightly curved at the apex.*

B. *Plant 3–6 ft. high.*

caroliniàna, Curtis. St. stout, smooth, simple: lvs. long-petioled; lfts. obovate-oblong, silky beneath; stipules large, clasping: racemes 6–12 in. long, erect, rigid, many-fld.: pod 2 in. long, erect, villous, and hoary. June, July. Mountains of N. C.

BB. *Plant 1–3 ft. high.*

C. *Stipules longer than the petiole.*

montàna, Nutt. Plant 1½ ft. high, somewhat silky-pubescent: lfts. oblong-obovate to oblong, 1–3 in. long: fls. in long spikes: pod straight, erect, pubescent. May, June. Western states. B.M. 3611. B.R. 1272 (both erroneously as *T. fabacea*).—Sometimes called "buffalo pen" in the West.

CC. *Stipules shorter than the petiole.*

D. *Racemes axillary.*

fabàcea, DC. Resembles *T. montana* and has possibly been confounded with it in the trade. It differs in having more spreading pods and larger and more compressed seeds. May, June. Siberia.

DD. *Racemes terminal.*

móllis, Curtis. St. erect, branched, 2–3 ft. high, pubescent: lfts. obovate-oblong, 1–2 in. long: racemes 6–10 in. long: pod slightly curved at the end, 2–4 in. long. May–July. Va. and N. C.

fraxinifòlia, Curtis. Sts. 1–3 ft. high: lfts. 3, oblanceolate to elliptic, oval or lanceolate, glabrous or nearly so; stipules linear to linear-lanceolate: fls. in a loose raceme 4–12 in. long: pod falcate, linear, pubescent, 2–4 in. long. Mountains of N. C. and Ga.

F. W. Barclay.
F. Tracy Hubbard.†

THESPÈSIA (Greek, *divine;* application doubtful). *Malvàceæ.* Trees or tall herbs, grown in the warmhouse, and planted in warm regions.

Leaves entire or angulate-lobed: fls. usually yellow, showy; calyx truncate, minutely or bristle-toothed, rarely 5-cleft; ovary 5-celled: caps. woody-coriaceous, loculicidally 5-valved.—About 10 species, Trop. Afr., Asia and the islands of the Pacific, and 1 from Porto Rico. They have the aspect of hibiscus and may be distinguished by the confluent stigmas, more woody caps., and the obovoid compressed seeds.

popúlnea, Soland. A small tree with the younger portions covered with peltate scales: lvs. long-petioled, ovate, cordate, acuminate, 3 in. across: fls. axillary, 2–3 in. across, yellow. Trop. Asia, Afr., and the islands of the Pacific.—Cult. in S. Calif., where it is said to succeed only in warm and moist locations. The fls. are described as varying from yellow to purple. A common tree on tropical seacoasts, reaching 30–40 or even 50 ft., with dense top, blooming all the year; the inner bark yields a fiber, and the wood is durable and useful.

T. grandiflòra, DC. Tree, 30–45 ft. high: lvs. ovate, subcordate, apex subacuminate: fls. purple or red, 4–5 in. diam. Porto Rico. The wood is used in Porto Rico for furniture and other purposes and it is recommended for ornamental uses.

F. Tracy Hubbard.†

THEVÈTIA (named for André Thevet, a French monk, 1502–1590). *Apocynàceæ.* Glabrous small trees or shrubs which are grown in the warmhouse, or out-of-doors in the extreme South.

Leaves alternate, 1-nerved or lightly feather-veined: fls. large, yellow, in terminal, few-fld. cymes; calyx 5-parted, many-glanded inside at the base, segms. acute, spreading; corolla funnelform; lobes broad, twisted; disk none; ovary shortly or deeply 2-lobed, 2-celled: drupe broader than long, 2-celled.—About 10 species, Trop. Mex. southward to Paraguay.

The yellow oleander of Florida gardens, *T. nereifolia,* is a very ornamental small evergreen shrub, growing luxuriantly in rich sandy soil, not too moist and not too dry, ultimately attaining a height of 6 to 8 feet and almost as much in diameter. The foliage is abundant, light glossy green, and reminds one of the oleander, but the leaves are narrower. The pale yellow flowers are abundantly produced. The fruit, which is of the size and somewhat of the form of a hickory-nut, is regarded as poisonous by the negroes. Thevetia can stand a few degrees of frost. If banked with dry sand in fall it does not suffer to any great extent, although the top may be killed. (H. Nehrling.)

A. *Lvs. 8–10 in. long, about 2 in. wide.*

nítida, DC. A tender shrub: lvs. oblong-lanceolate, acuminate, margins revolute: fls. rather large; corolla white, with a yellow throat. W. Indies; cult. in S. Calif.

AA. *Lvs. 3–6 in. long, less than ½in. wide.*

nereifòlia, Juss. Known locally in Fla. as "trumpet-flower" and incorrectly as "yellow oleander." A tender shrub: lvs. linear, shining, margins revolute: fls. about 3 in. long, yellow, fragrant. W. Indies, Mex. B.M. 2309 (as *Cerbera Thevetia*).—Cult. in S. Fla. and S. Calif.

F. Tracy Hubbard.†

THIBAÙDIA (named for Thiebaud de Berneaud, a French botanist). *Ericàceæ.* Shrubs with the st. sometimes tall-climbing: lvs. alternate, persistent and leathery: fls. in numerous many-fld. axillary racemes, scarlet; calyx 5-lobed or 5-toothed; corolla tubular, contracted at the mouth, 5-lobed; stamens 10; ovary 5-celled: berry small, globose, 5-celled. About 20 species, Trop. Amer. Probably none of the true Thibaudias is common in cult., although the two following species have been grown. *T. floribúnda,* HBK., with grayish branches, oblong-lanceolate lvs. and glabrous fls. in solitary raceme. Peru. *T. pichinchénsis,* Benth., growing 6–12 ft. high, with lvs. 3–4 in. long and oval-oblong or sublanceolate and the calyx scurfy-tomentose. Ecuador. *T. acuminàta,* Wall., is correctly *Corallobòtrys acuminàta,* Hook. f. (*Epigýnium acuminàtum,* Klotzsch). Shrub 2–4 ft. high: branches thick: lvs. alternate, petioled, 5 x 1½ in., sometimes 10 x 2¾ in., lanceolate, base cuneate, glabrous: fls. red, in axillary corymbs; calyx-tube cinereous pubescent or glabrous, 5-lobed; corolla glabrous or glandular-puberulent outside, small, 5-toothed. India. B.M. 5010.

T. glàbra, Griff.=Agapetes glabra.—*T. macrántha,* Hook.=Agapetes macrantha. J.F. 1:95. R.B. 26:181.—*T. púlchra,* Hort., is offered in the trade as an orange-red-fld. form. This may be the same as T. pulcherrima, Wall., which equals Agapetes variegata.—*T. setígera,* Wall.=Agapetes setigera. F. Tracy Hubbard.

THISTLE: *Carduus, Cirsium.* **Blessed T.:** *Cnicus.* **Cotton T.:** *Onopordon.* **Globe T.:** *Echinops.* **Golden T.:** *Scolymus.* **Scotch T.:** *Onopordon.* **Sow T.:** *Sonchus.*

THLADIÁNTHA (Greek, *to crush* and *flower;* the author of the genus is said to have named it from pressed specimens). *Cucurbitàceæ.* Herbaceous softly pubescent vines with tuberous roots, some of which are hardy, others adapted to the greenhouse.

Leaves ovate-cordate, denticulate, sinus deep; tendrils simple: fls. dicœcious, rather large, golden yellow; male fls. solitary or racemose, calyx-tube short-campanulate, 5-lobed, corolla rather irregularly campanulate, 5-parted, stamens 5, ovary rudimentary; female fls. solitary, calyx and corolla as in the male, stamens rudimentary or none; ovary oblong, pubescent, with 3 placentæ: fr. oblong, fleshy, indehiscent, many-seeded. —About 13 species, China, Java, and Himalayas.

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dúbia, Bunge. A tall climber: lvs. light green, oval, base cordate, apex acute: fls. numerous, yellow, bell-shaped; male fls. solitary in the axils without bracts: fr. ovoid-oblong, about 2 in. long, red; seeds black, smooth. Summer. N. China. G.C. III. 28:279; 54:54. B.M. 5469 (male fl. only). G.M. 43:657.—According to R. I. Lynch, in Gn. 56, p. 518, the plants are of easy cult. and by planting both sexes and artificial pollination the fr. may be grown. He further states that the root-tubers are without buds but form buds just before growth commences, as does a root-cutting. According to Danske Dandridge, the plant is hardy in W. Va., increasing rapidly by tubers and becoming a pest when planted with choicer plants.

Óliveri, Cogn. More vigorous than the former: annual sts. attaining a height of 30 ft. or more, glabrescent, tubers absent: lvs. larger, cordate, acute, about 8 in. long: fls. more numerous, golden yellow. Cent. China. R.H. 1903, p. 473.—There is also a hybrid between these two species which is offered in the trade.

F. Tracy Hubbard.†

THLÁSPI (Greek, *crushed*, referring to the strongly flattened pods and seeds). *Cruciferæ*. Annual or perennial herbs which are glabrous or glaucous, rarely pilose, some of which are cultivated now and then.

Leaves basal, rosulate, entire or dentate; cauline oblong, hastate-auriculate: fls. racemose, without bracts, white, rose, or pale purple; sepals erect, equal at base; petals obovate; stamens free, without appendages: silique short, laterally compressed, oblong, obcordate or obcuneate.—About 90 species, widely distributed in the temperate, alpine, and arctic regions, mostly in the northern hemisphere, but also in S. Amer., S. Afr., and Austral.

alpéstre, Linn. Perennial, 2–12 in. high but usually low, glabrous, somewhat glaucous, habit tufted, forming rather thick mats: basal lvs. in a rosette, petioled, obovate; cauline lvs. elongated-lanceolate, base cordate, entire or dentate: peduncle unbranched, terete: fls. white, sometimes somewhat reddish; sepals purplish. Alpine Eu.—Has been offered as a neat little rock-plant. It should be given shade and a cool moist soil. The material growing in Colo. and formerly called *T. alpestre* is now considered a distinct species, **T. colorádense,** Rydb. Perennial, cespitose: basal lvs. rosulate, broadly spatulate, sinuately crenate or subentire; cauline lvs. oblong or obovate, obtuse: infl. short and dense; fls. white; sepals with a white margin. Mountains of Wyo. and Colo. The fls. are larger than those of *T. alpestre* and the pod differs. It is uncertain whether the material in cult. in Amer. is this plant or *T. alpestre*.

arvénse, Linn. Penny Cress. Annual or biennial, 6–18 in. high, glabrous, yellow-green: basal lvs. obovate or spatulate, petioled; upper lvs. oblong, remotely and irregularly dentate: fl.-st. mostly branched above: fls. small, white; sepals greenish. Eu.—A weed in most countries, including Amer.

T. bellidifólium, Griseb. Perennial, dwarf, cespitose: basal lvs. oblong-spatulate; cauline lvs. few, oblong, very short auriculate: fls. violet. Mountains of S. E. Eu. and Caucasus.—*T. rotundifólium*, Gaudin. Perennial, 2–6 in. high: sts. numerous, ascending: basal lvs. rotundate-ovate, petioled; cauline lvs. clasping, auricled: fls. violet, rarely white. Switzerland. G.C. III. 49:116.

F. Tracy Hubbard.

THORN: *Crataegus.* **Christ's T.:** *Paliurus Spina-Christi.* **Jerusalem T.:** *Paliurus Spina-Christi;* also *Parkinsonia aculeata.* **Swallow T.:** *Hippophaë rhamnoides.*

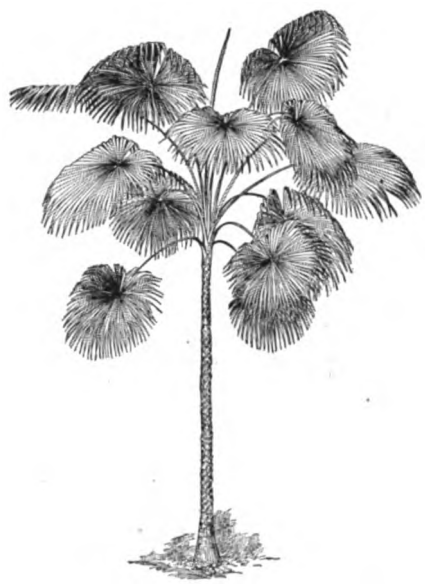
THORN-APPLE: *Datura Stramonium;* also *Crataegus.*

THRIFT: *Armeria, Statice.*

THRÌNAX (Greek, *fan*). *Palmàceæ*, tribe *Córypheæ*. Thatch Palm. Fan palms well adapted for pot culture.

Spineless palms: trunks low or medium, solitary or cespitose, ringed below, clothed above by the fringed lf.-sheaths: lvs. terminal, orbicular or truncate at the base, flabellately plicate, multifid; segms. induplicate, bifid; rachis short or none; ligule free, erect, concave; petiole slender, biconvex, smooth on the margins; sheath usually beautifully fringed: spadices long; axis clothed with tubular sheaths, papery-coriaceous, split: fls. perfect, the calyx and corolla united into a lobed or entire cup, on rather long, slender pedicels, the pedicel with a caducous bract at the base; stamens 6, their filaments united below; ovary 1-celled: fr. the size of a pea.—About 17 species, native to W. Indies and Fla., and not much known in cult. For the new Porto Rican species, see Cook, Bull. Torr. Bot. Club, Oct., 1901 (vol. 28). Upon a technical embryo character some of the species below and many other wild species are segregated to constitute the genus Coccothrinax, Sargent. As that genus does not differ horticulturally, these species are here treated with Thrinax. See *Coccothrinax*.

The species are of slow growth, but succeed with indifferent care. They are mostly of elegant form and habit. A good specimen is shown in Fig. 3794.



3794. A good specimen of Thrinax.

A. *Under surface of lvs. green.*

B. *Ligule with a blunt appendage at the middle.*

radiàta, Lodd. (*Coccothrinax radiàta*, Schum. *T. élegans*, Hort.). Caudex short: lvs. green, glabrous or slightly puberulent beneath; segms. united to or beyond one-third; ligule broadly rounded, with a short, blunt appendage at the middle: spadix large, 2–2½ ft. long, paniculate. Cuba to Trinidad.—Said to have been known in cult. as *T. elegans* and *T. gracilis*.

BB. *Ligule bluntly deltoid.*

parviflòra, Swartz. Caudex 10–20 ft. tall: lvs. 10–25 in. long, minutely pubescent, becoming glabrous, green beneath; segms. united one-fourth or one-sixth their length; ligule bluntly deltoid, 1½ lines long. Jamaica. —The plant of Fla. heretofore known as *T. parviflora* seems to be *T. floridàna*, Sarg., a plant not in the trade. S.S. 10:510.

BBB. *Ligule obsolete, truncate.*

barbadénsis, Lodd. (*Coccothrinax barbadénsis*, Becc.). Trunk middle-sized: lvs. green, glabrous; segms. united at the base; ligule obsolete, truncate: spadix paniculate: berry polished, ⅓in. thick. Barbados.

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AA. *Under surface of lvs. silvery or glaucous.*

B. *Lf.-segms. connivent at base.*

argéntea, Lodd. (*Coccothrìnax argéntea*, Schum.). Caudex 12–15 ft. high, 2–3 in. thick: lvs. shorter than the petiole, silvery gray beneath, making one of the most beautiful effects in all the palms; segms. united at the base; ligule concave, semi-lunar, erose. W. Indies.

BB. *Lf.-segms. connivent for one-third their length.*

excélsa, Lodd. Lvs. pale green above, hoary-glaucous beneath; segms. united one-third; ligule bluntly deltoid; sheath densely buff-lanate. Jamaica, British Guiana.—Held by some to be a form of the preceding.

BBB. *Lf.-segms. connivent for one-half their length.*

multifìdra, Mart. (*T. graminifòlia*, Hort.). St. medium, 6–8 ft. high: sheaths ragged, fibrous, irregularly reticulate, tomentose: young lvs. white woolly-tomentose; blade equaling the petiole, laciniate; segms. united one-half their length, ensiform-acuminate, rather strict, glaucous beneath; ligule transversely oblong, sinuate, 3-lobed. Haiti. I.H. 31:542.

Other species of Thrinax are in cult. in private collections (see p. 2446), but it is doubtful whether they are in the trade. Some of them may be listed as Coccothrinax. *T. altìssima*, Hort. Lvs. large, 4½ ft. diam., nearly orbicular, the upper lobe of the base folding over the lower one some 7 or 8 segms., rich glossy green above, brilliant silvery beneath, with about 58 segms. which reach over one-third of the way to the base; ligule deep buff-orange, subreniform, open at base; a small basal area of the lf. orange-tinted; petioles 4½ ft. long, biconvex, slightly channeled above, bases included in a closely woven network of strong fiber, greenish yellow, the fiber ashy brown. Grows with vigor in Fla., on ordinary pineland. The botanical position of this palm is undetermined. —*T. argéntea*, Chapm.=Coccothrinax.—*T. Chùco*=Acanthorrhiza Chuco.—*T. crinìta*, Griseb. & Wendl. Cuban. A moderate-sized palm with lvs. about 3 ft. diam., and with a short, stiff ligule. Probably belongs, according to Beccari, somewhere near Coccothrinax argentea. This palm was lost to science for 60 years and has recently been rediscovered. A specimen growing in the Brooklyn Botanic Garden has the trunk covered with a fibrous hair-like growth, unlike any W. Indian palms known.—*T. elegantìssima*, Hort., seems to be unknown to botanists. It may be T. elegans which probably belongs to T. radiata.—*T. floridàna*, Sarg. A slender tree, to 30 ft.: lf.-blades 3–4 ft. across, yellowish green, shining above: spadix 3–4 ft. long: fls. slender-pedicelled, the sepals and petals united; filaments subulate: fr. small, ½in. diam. or less. Fla. and Keys.—*T. Gàrberi*, Chapm.=Coccothrinax.—*T. keyènsis*, Sarg. Rather stout, 25 ft., the trunk on a base of matted roots: lf.-blades 3–4 ft. across, yellowish green above: spadix 6 ft. or so long: fls. on short disk-like pedicels, and sepals and petals only partly united; filaments triangular: fr. ¼in. or less thick. Lower Keys.—*T. microcàrpa*, Sarg. Tree, 30 ft. or more: lf.-blades 3–4 ft. broad, pale green above and silvery white beneath: spadix 1–2 ft. long: fls. on disk-like pedicels, the sepals and petals only partially united; filaments triangular: fr. very small, only ⅛in. or less thick. Keys of Fla.—*T. Mòrrisii*, Wendl. One to 2½ ft. high: lvs. glaucescent beneath; segms. free for about two-thirds or three-fourths their length. G.C. III. 11:113; 30:353. Anguilla.—*T. Wendlandiàna*, Becc. Lvs. flabellate-orbicular, paler beneath; segms. linear-oblong: spadix elongated: fls. long-pedicelled. Cuba and Honduras.

N. TAYLOR.†

THRIXSPÉRMUM (Greek, *hair* and *seed*, referring to the hair-shaped seeds). Syn., *Sarcochìlus*. *Orchidàceæ*. Epiphytic non-pseudobulbous orchids, grown for their bloom in the warmhouse.

Stems short, either covered with prominent persistent truncate bases of the lvs. or leafless: lvs. flat and often falcate, or narrow-linear, or none: racemes axillary; bracts small; sepals and petals nearly equal, free, spreading, the lateral sepals often more or less dilated at the base; labellum articulate at the end of the basal projection of the column, 3-lobed; column short, erect, produced at the base; pollen-masses 4: caps. usually linear or narrow-oblong.—Species 30, Old World.

Cecíliæ, Reichb. f. (*Sarcochìlus Cecíliæ*, F. Muell.). Sts. short, sometimes elongated to 2–3 in.: lvs. linear or narrowly linear-lanceolate, thick, 2–3 in. long: racemes up to 6–8 in. long, erect, bearing above the middle several small short-pedicelled pink fls.; lateral sepals almost ovate, dorsal sepal narrower; petals still narrower; labellum shorter than the sepals. Austral.

Hártmannii, Reichb. f. (*Sarcochìlus Hàrtmannii*, F. Muell.). Sts. short: lvs. fleshy, 3–5 in. long: scapes erect: fls. rather small; sepals and petals white, spotted basally with red; labellum shorter, saccate, white, streaked with red-purple. Queensland. G. 32:337.

lilácinum, Reichb. f. (*Sarcochìlus lilàcinus*, Griff.). Climbing: sts. slender, 2–3 ft. high: lvs. alternate, ovate, pale green, 1½–2 in. long, cordate and amplexicaul at the base: raceme 1–8 in. long; rachis very stout, compressed, few- to many-fld.: fls. pale rose, white-lilac or bluish, very short-pedicelled; sepals and petals broadly ovate; labellum saccate, white, yellowish and pubescent within: caps. 4–6 in. long, linear. Malaya. B.M. 7754.

F. TRACY HUBBARD.

THRYÁLLIS (old Greek name, transferred to these plants). *Malpighiàceæ*. Confusion in practice has arisen in the application of this name and Galphimia. As expressed by J. N. Rose, "the genus Thryallis was published by Linnæus in the second edition of his Species Plantarum, basing it upon a single species, *T. brasiliensis*. In 1829 Martius described two additional species, *T. longifolia* and *T. latifolia*. These two species, however, were soon found not to be congeneric with the original species, but instead of being taken out as a new generic type, were allowed to remain as Thryallis, while the true type of that genus was transferred to Galphimia." Kuntze gave the name Hemsleyna to the two plants of Martius. If Thryallis is restored to its original application, with its legitimate extension, then the plants described under Galphimia, page 1312, become *T. brasiliensis*, Linn. (*G. brasiliensis*, Juss.); *T. hirsuta*, Kuntze (*G. hirsuta*, Cav.); *T. glauca*, Kuntze (*G. glauca*, Cav.). There is a native species, *T. angustifolia*, Kuntze (*G. angustifolia*, Benth.), in Texas and adjacent Mexico, 1 to 2½ feet tall, more or less woody at base, with linear to lanceolate leaves and petals yellow turning reddish.

THRYPTÓMENE (Greek word said to refer to the low heath-like appearance of the plant). *Myrtàceæ*. Glabrous heath-like shrubs, which were at one time popular greenhouse plants, now apparently not so commonly in cult. Lvs. opposite, small, entire: fls. small, sessile or pedicelled, solitary at the axils or rarely fasciculate; bracteoles 2; calyx-tube hemispherical, turbinate or short-campanulate limb with 5 petaloid or scarious, entire, spreading segms.; petals 5, persistent, usually connivent above the genital organs; stamens 10; ovary inferior, 1-celled: fr. sometimes 1-seeded, indehiscent, sometimes 2-seeded and spuriously 2-berried. —About 25 species, Austral.

Mitchelliàna, F. Muell. A compact, bushy shrub with slender branches: lvs. oblong, flat, ¼–½in. long: fls. in the upper axils solitary or in clusters of 2 or 3, white. Offered in S. Calif.—Intro. by Mrs. T. B. Shepherd, who says the plant rarely exceeds 4 ft. in height, blooms in midwinter and is good for cut-fls.

F. TRACY HUBBARD.†

THÙJA (*Thya* or *Thyia*, an ancient Greek name for a resinous tree or shrub). Also spelled *Thuya* or *Thuia*. Including *Biòta*. *Pinàceæ*. ARBOR-VITÆ. Ornamental woody plants, grown for their handsome evergreen foliage and formal habit.

Resiniferous trees with short horizontal much ramified branches; the flattened branchlets arranged frond-like: lvs. decussate, scale-like, appressed, usually glandular on the back: fls. monœcious, globose, small, terminal on short branchlets, staminate yellow and consisting of usually 6 opposite stamens each with 2–4 anther-cells; pistillate consisting of 8–12 scales in opposite pairs, of which only the middle ones, or in the section Biota the lower ones, are fertile, each scale with 2 ovules inside at the base: strobiles globose-ovate to oval-oblong, with 2 seeds under the fertile scales.—Five species occur in N. Amer., E. and Cent. Asia. The wood is light and soft, brittle and rather coarse-

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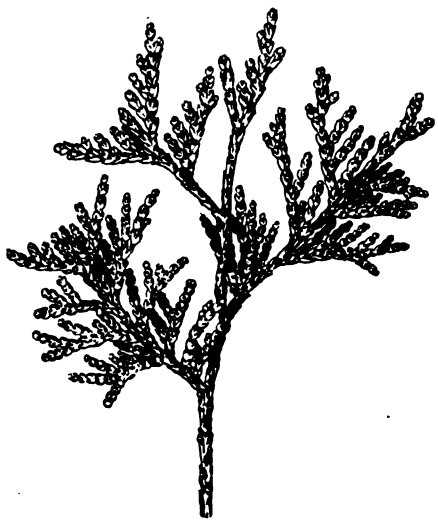
grained, durable in the soil; it is much used for construction, cabinet-making, and in cooperage. *T. occidentalis* contains a volatile oil, and thujin and is sometimes used medicinally.

The thujas are trees of narrow pyramidal habit, but low and bushy in many of the numerous garden forms, with much ramified branches, the branchlets arranged frond-like, flattened and clothed with small scale-like leaves; the fruit is a small strobile or cone not exceeding



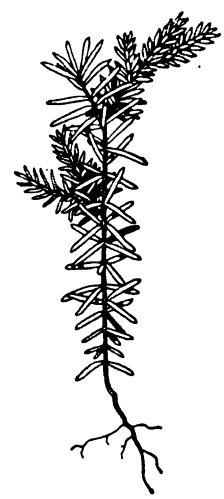
3795. Typical form of Thuja occidentalis. (×⅓)

1 inch in length. The well-known *T. occidentalis* is hardy North; and also *T. Standishii*, *T. plicata*, and several forms of *T. orientalis* are hardy as far north as Massachusetts. Thujas are favorites for formal gardens. They are all of regular symmetrical habit. Their numerous garden forms vary greatly in habit and in color of foliage. For planting as single specimens in parks they are mostly too stiff and formal, but they are well suited for massing on borders of streams or lakes. The most beautiful and the most rapidly growing species is *T. plicata*. Thujas are well adapted for hedges and windbreaks (see Gn.M. 2:15). They bear pruning well and soon form a dense hedge. They thrive best in somewhat moist, loamy soil and are easily transplanted. Propagation is by seeds sown in spring. The varieties, especially those of *T. occidentalis*, are usually propagated by cuttings taken late in summer and kept during the winter in a cool greenhouse or frame; also by grafting on seedling stock in summer or early in spring in the greenhouse. The varieties of *T. plicata* and *T. orientalis* are usually grafted, since they do not grow readily from cuttings, except the juvenile forms of the latter, as var. *decussata* and var. *meldensis*. Consult *Retinispora*.

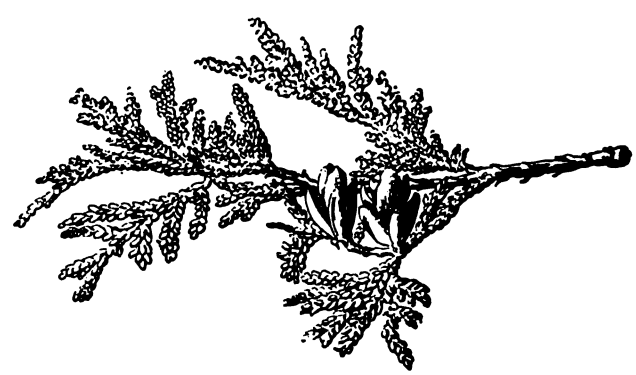
A. *Cones pendulous, with thin scales apiculate below the apex; seeds winged, compressed: branchlets ramified more or less horizontally, with a distinct upper and under side.*

B. *Lvs. yellowish or bluish green beneath, glandular: leading shoots compressed.*

occidentàlis, Linn. COMMON ARBOR-VITÆ. Erroneously but commonly called WHITE CEDAR (which is properly Chamæcyparis). Figs. 3795–3797. Tree, attaining 60 ft. and more, with short horizontal branches ascending at the end and forming a narrow pyramidal rather compact head: lvs. ovate, acute, usually glandular, bright green above, yellowish green beneath, changing in winter usually to dull brownish green: cones oval to oval-oblong, about ½in. long, brownish yellow with usually 2 pairs of fertile scales; seeds ⅛in. long. New Bruns. to Man., south to N. C. and Ill. S.S. 10:532. Gn.M. 4:19. F.E. 25:495.—Much used for telegraph poles. A great number of garden forms, about 50, are in cult. The best known are the following: Var. **álba,** Nichols. (var. *álbo-spìca*, Beissn. Var. Queen Victoria, Hort.). Tips of young branchlets white. Var. **argéntea,** Carr. (var. *álbo-variegàta*, Beissn.). Branchlets variegated silvery white. Var. **aûrea,** Nichols. Broad bushy form, with deep yellow foliage (F.E. 22: 797); also var. **Búrrowii,** Douglas' Golden and Meehan's Golden are forms with yellow foliage. See also var. *lutea*. Var. **aûreovariegàta,** Beissn. (var. *dùrea maculàta*, Hort.). Foliage variegated with golden yellow. Var. **Beterámsii,** Schwerin. Copper-colored, gradually changing to green. Var. **cónica dénsa,** Hort. "Dense conical form." Var. **Colúmbia,** Hort. "Strong habit; foliage broad, with a beautiful silvery variegation." Var. **compácta,** Beissn. (var. *Froèbeli*, Hort. Var. *globulàris*, Hort.). Globose, light green form with rather thin branchlets. Var. **cristàta,** Carr. Irregular dwarf, pyramidal form with stout, crowded, often recurved branchlets. Var. **Douglasii pyramidàlis,** Spaeth. Dense pyramidal form with short densely branched fern-like branches often cristate at the ends. Var. **dumòsa,** Hort. (var. *plicàta dumòsa*, Gord.). Dwarf and dense form of somewhat irregular habit; in foliage similar to var. *plicata*. G.M. 54:223. Var. **Ellwangerìana,** Beissn. (var. Tom Thumb). Fig. 3798. A low broad pyramid, with slender branches clothed with two kinds of foliage, adult lvs. and primordial, acicular spreading lvs.; it is an intermediate form between the var. *ericoides* and the type. R.H. 1869, p. 350; 1880, p. 93. Var. **Ellwangerìana aûrea,** Spaeth. Like the preceding but with yellow foliage. Var. **ericoìdes,** Beissn. & Hochst. (*Retinispora dùbia*, Carr. *R. ericoìdes*, Hort., not Zucc.). Fig. 3799. Dwarf, globose or broadly pyramidal form, with slender branchlets clothed with needle-shaped soft spreading lvs., dull green above, grayish green beneath and assuming a brownish tint in winter. R.H. 1880, pp. 93, 94. A juvenile form. See, also, *Retinispora*. Var. **globòsa,** Beissn. (Var. *compácta globòsa*, Hort.). Dwarf globose form, similar to var. *compacta*, but lower and smaller. Var. **fastigiàta,** Beissn. (var. *pyramidàlis*, Hort. Var. *columnàris*, Hort.). Columnar form with short branches. Var. **filifórmis,** Beissn. (var. *Douglasii*, Rehd.). Bushy



3796. Seedling of Thuja occidentalis. (×½)



3797. The arbor-vitæ.—Thuja occidentalis. (Nearly full size)

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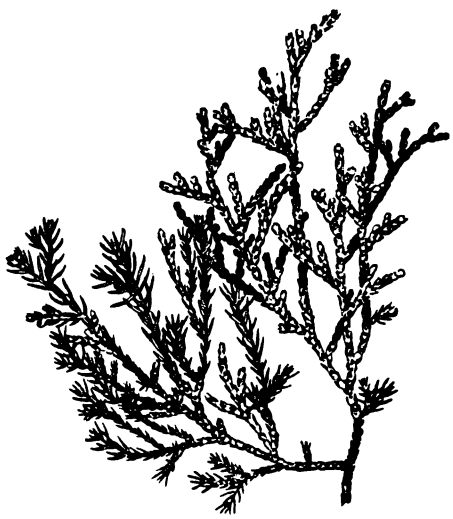
form, with long and slender sparingly ramified branches nodding at the tips, partly 4-angled and clothed with sharply pointed lvs. A very distinct form, somewhat similar to *Chamæcyparis pisifera* var. *filifera*. M.D.G. 1901:357. Var. **Hárrisonii,** Hort. "A neat little tree with the entire foliage tipped almost pure white." Var. **Hôveyi,** Veitch. Dwarf, dense, ovate-globose form with bright green foliage. Var. **intermèdia,** Hort. "Of dwarf,



3798. Thuja occidentalis var. Ellwangeriana. (×⅓)

compact habit." Var. **Little Gem,** Hort. Very dwarf dark green form, growing broader than high. Var. **lûtea,** Veitch (var. *elegantissima*, Hort. Var. George Peabody Golden). Pyramidal form, with bright yellow foliage. F.E. 27:7. Var. **nàna,** Carr. (*T. plicàta* var. *compácta*, Beissn.). Dwarf compact globose form; foliage similar to var. *plicata*. Var. **péndula,** Gord. With the branches bending downward and the branchlets more tufted. M.D.G. 1901:169. Var. **plicàta,** Mast. (*T. plicàta*, Parl., not Don. *T. Wareàna*, Booth). Pyramidal tree, darker and denser than the type: branchlets short, rigid, much flattened: foliage distinctly glandular, brownish dark green above, bluish green beneath. G.C. III. 21:258. Said to have been intro. from N. W. Amer., but not found wild there. Var. **pûmila,** Beissn. Dwarf dense form with dark green foliage. Var. **pygmæa,** Hort. (*T. plicàta* var. *pygmæa*, Beissn.). Similar to var. *dumosa*, but still dwarfer, with bluish green foliage. Var. **Rèidii,** Hort. "Broad, dwarf form with small lvs., well retaining its color during the winter." Var. **Spaèthii,** P. Smith. Peculiar form with two kinds of foliage; the younger and lower branchlets with spreading acicular lvs. like those of var. *ericoides*, but thicker in texture; the upper branchlets slender and sparingly ramified much like those of var. *filiformis*. Gt. 42, p. 539. Var. **Verværneàna,** Henk. & Hochst. Of smaller and denser habit than the type: branchlets slenderer, with yellowish foliage, bronzy in winter. F.E. 30:1117. G.W. 1, p. 296; 6, p. 474. Var. **Wagneriàna,** Beissn. (var. *Vérsmannii*, Hort.). Globose form, retaining its bright green color during the winter. M.D.G. 1895:123. Var. **Wareàna,** Beissn. (var. *robústa*, Carr. *T. caucásica*, *T. talárica*, and *T. sibírica*, Hort.). Pyramidal tree, lower and denser than the type, with stouter branchlets; foliage bright green. Very desirable form. Gn.M. 2:11. R.H. 1908, p. 79. G.W. 1, p. 295. Var. **Wòdwardii,** Hort. "Dense, globose form, with deep green foliage."

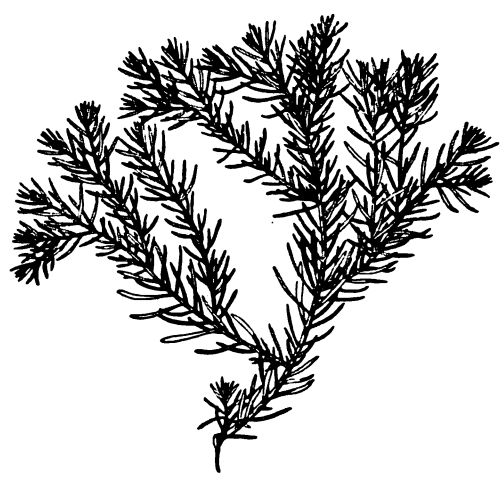
BB. *Lvs. with whitish markings beneath, without or with indistinct gland.*

plicàta, Don (*T. gigantèa*, Nutt. *T. Ménziesii*, Douglas. *T. Lóbbii*, Hort.). Fig. 3800. Tall tree, attaining 200 ft., with short horizontal branches often pendulous at the ends, forming a narrow pyramid: trunk with a much-buttressed base and clothed with cinnamon-red bark: branchlets slender, regularly and closely set: lvs. bright green and glossy above, dark green beneath and with whitish triangular spots: lvs. of vigorous shoots widely spaced, ending in long points parallel to axis, of the lateral branchlets acute and scarcely glandular: cones cylindric-ovoid, little over ½in. long; scales 8–10, elliptic-oblong, usually the 3 middle pairs fertile; seeds winged, notched at the apex. Alaska to N. Calif. and Mont. S.S. 10:533. G.C. III. 21:215, 258 (adapted in Fig. 3800). G.F. 4:116. Gn. 74, p. 65. G. 9:305. M.D.G. 1909:42. Var. **atróvirens,** Sudw. (*T. gigantèa atróvirens*, Beissn.). Foliage dark green. Var. **fastigiàta,** Schneid. (*T. gigantèa fastigiàta*, Beissn. *T. gigantèa pyramidàlis*, Bean). Columnar form. G.C. III. 41:200. Var. **grácilis,** Rehd. (*T. gigantèa* var. *grácilis*, Beissn.). Smaller tree, with more slender branches and smaller foliage of paler green. Var. **péndula,** Schneid. (*T. gigantèa péndula*, Beissn.). Form with slender pendulous branches.

Stándishii, Carr. (*T. japónica*, Maxim. *T. gigantèa* var. *japónica*, Franch. & Sav. *Thujópsis Stándishii*, Gord.). Fig. 3801. Similar to the preceding but lower, usually only 20–30 ft. high: branchlets more irregularly set, thicker and less compressed: lvs. of vigorous shoots closely placed together, ending in short rigid points spreading outward, of the lateral branchlets ovate, obtusish, thickish, lighter green above, darker beneath and with whitish, triangular spots, without gland: cones oval, little over ½in. long; scales 8, oval, usually the 2 middle pairs fertile. Japan. G.C. III. 21:258 (adapted in Fig. 3801). R.H. 1896:160. C.L.A. 11:311. S.I.F. 1:11.

AA. *Cones upright, the thickened scales with a prominent horn-like process below the apex; seeds wingless: branchlets ramified in a vertical plane with both sides nearly alike.* (*Biota.*)

orientàlis, Linn. (*Biòta orientàlis*, Endl.). Pyramidal or bushy tree, attaining 25 ft., with spreading and ascending branches: branchlets thin: lvs. rhombic-ovate, acute, bright green, with a small gland on the



3799. Thuja occidentalis var. ericoides. (×⅓)

back: cones globose-ovate, ½–1 in. long; usually 6 ovate scales, each with a horn-like process, the uppermost pair sterile. From Persia to E. Asia, in Japan probably only cult. There are many garden forms, of which the following are the best known: Var. **athrotaxoides,** Carr. Dwarf, irregularly and not frond-like branching; branchlets nearly quadrangular, slender, dark green. R.H. 1861, p. 230. Var. **aûrea,** Hort. Low,

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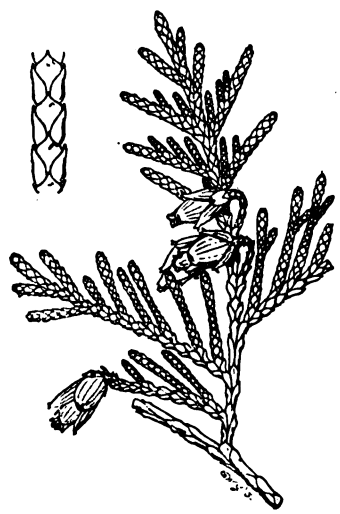
compact, globose shrub, golden yellow in spring, changing to bright green. G.W. 1, p. 299. Var. **aûrea conspícua,** Hort. More erect, the intense golden foliage partially suffused with green. Var. **aûrea nàna,** Hort. Golden yellow foliage and very dwarf and compact habit. Var. **aûreo-variegàta,** Hort. Of pyramidal habit: branchlets variegated with yellow. Var. **beverleyénsis** (*Thùja beverleyénsis,* Hort.). A columnar form with the tips of the branchlets golden yellow. Var. **decussàta,** Beissn. & Hochst. (*Retinispora juniperoìdes,* Carr. *Chamæcýparis decussàta,* Hort.). Fig. 3369. Dwarf globose form: lvs. linear-lanceolate, spreading, stiff, acute, bluish green. A juvenile form; see, also, *Retinispora.* Var. **elegantíssima,** Gord. Of low columnar habit, bright yellow in spring, yellowish green afterward. Var. **falcàta,** Lindl. Of dense pyramidal growth, deep green, the horns of the strobiles curved backward. Var. **filifórmis stricta,** Hort. Round-headed dwarf bush, with upright, thread-like branches. Var. **grácilis,** Carr. Of pyramidal somewhat loose and slender habit, with bright green foliage. Var. *frenelοìdes* and var. *nepalénsis* are hardly different from this. Var. **meldénsis,** Veitch. Of columnar pyramidal somewhat irregular growth: lvs. acicular, bluish green, sometimes passing into the normal form. Intermediate between the var. *decussata* and the type. Var. **péndula,** Parl. (var. *filifórmis,* Henk. & Hochst. *T. péndula,* Lamb. *T. filifórmis,* Lindl.). Branches pendulous, thread-like, sparingly ramified, and with the lvs. wide apart and acuminate. Var. *funiculàta,* Hort., and var. *intermèdia,* Carr., are intermediate forms between this variety and the type. H. U. 4:70. Var. **pyramidàlis,** Endl. Of pyramidal habit, with bright green foliage; one of the tallest and hardiest varieties. Var. **semperauréscens,** Veitch. Dwarf, globose; the golden hue of the foliage remains throughout the whole year. Var. **Sièboldii,** Endl. (var. *japónica,* Sieb. Var. *nàna,* Carr. Var. *Zuccariniàna,* Veitch. Var. *compácta,* Beissn.). Globose compact low form, bright green.



3800. Thuja plicata. (× ⅓)

T. dolobràta, Linn.=Thujopsis dolobrata.

ALFRED REHDER.

THUJÓPSIS (Greek, *Thuja-like*). Also spelled *Thuyopsis. Pinàceæ.* Ornamental tree or shrub grown chiefly for its handsome evergreen foliage and the formal habit.

A tree closely related to Thuja and chiefly distinguished by the broader much flattened branchlets and by its conelets having 3–5 winged seeds under each scale.—Only one Japanese species. Its yellowish white close and straight-grained wood is very durable and is used in Japan in boat- and bridge-building.

Thujopsis is one of the most beautiful Japanese conifers and forms a pyramidal tree, in cultivation sometimes shrubby, with spreading branches, the branchlets arranged in a frond-like fashion, much flattened and clothed with scale-like glossy green foliage. It is well adapted for planting as a single specimen on the lawn wherever it can be grown successfully. It is hardy as far north as Massachusetts, but usually suffers from summer drought. It thrives best in a sheltered and shaded position and in moist loamy soil, and seems to grow to perfection only in cool and moist climates. Propagation is by seeds, also by cuttings and by grafting like thuja. Plants raised from cuttings usually grow into bushy round-headed plants. Plants grafted on thuja are said to be short-lived. Seedlings are therefore to be preferred.

dolobràta, Sieb. & Zucc. (*Thùja dolobràta,* Linn.). Pyramidal tree, attaining 50 ft., or sometimes shrubby: branchlets irregularly whorled or scattered, horizontally spreading and often nodding at the ends; branchlets ⅛–¼ in. broad: lvs. glossy green above, marked with a broad white band beneath, those of the upper and under side obovate-oblong, obtuse, adnate except at the apex, the lateral ones spreading, ovate-lanceolate and curved (hatchet-shaped), obtusish: cone globose-ovoid, about ¾in. long; scales 6–10, much thickened at the obtusely pointed apex, the middle ones fertile and with 3–5-winged seeds under each scale. Japan. S.Z. 2:119, 120. G.C. II. 18:556. Gn. M. 2:23. G.Z. 25, p. 49. F.E. 16:517. C.L.A. 7:364. S.I.F. 1:11. Var. **altíssima,** Ansorge. Vigorous and of almost columnar habit. Var. **cristàta,** Ansorge. Branches compact, very full and somewhat crisped. Var. **nàna,** Sieb. & Zucc. (*T. lætèvirens,* Lindl.). Dwarf form, with more slender and narrower branchlets of a lighter green. Var. **plicàta,** Ansorge. Very vigorous with heavy branches which hang over and appear folded. Var. **variegàta,** Fortune. Tips of branchlets creamy white. Var. **Hóndai,** Makino (*T. Hóndai,* Henry). Tall tree, to 100 ft.: branches more densely ramified: lvs. smaller and whiter beneath: cone subglobose, with the scales not thickened at the apex. This is the more northern form and probably hardier than the type which has been called var. *austràlis* by Henry. Recently intro. and now growing at the Arnold Arboretum.

3801. Thuja Standishii. (× ⅓)

T. boreàlis, Hort.=Chamæcyparis nootkatensis.—*T. Stándishii,* Gord.=Thuja Standishii.

ALFRED REHDER.

THUNBÉRGIA (after Karl Peter Thunberg, professor of botany at Upsala and successor to Rudbeck and Linnæus; died 1828). *Acanthàceæ.* Mostly tall perennial climbers producing flowers in great profusion; greenhouse, and in the open far South.

Leaves opposite: fls. blue, yellow, purple, or white, solitary and axillary or in racemes; calyx annular and scarcely lobed or toothed or 10–15-toothed, surrounded by 2 large bracts which often inclose also the corolla-tube; corolla trumpet-shaped, with a spreading limb, tube curved or oblique, often compressed, enlarged toward the mouth; stamens 4, didynamous, fixed near the base of the tube, filaments thickened at the base, separate; anther-cells parallel, equal, mostly mucronate at the base: ovary seated on a fleshy disk, 2-loculed, each cell with 2 ovules (rarely only 1). The Thunbergieæ are distinguished by the contorted corolla, the 4-seeded caps., and the globose seeds.—About 75 species, in the tropics of the world, particularly in Afr.

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The thunbergias are nearly all vigorous greenhouse climbers resembling allamandas in habit. In large conservatories where they are not cramped for room they flower freely and display their flowers to the best advantage. Severe pruning, which is necessary in small greenhouses, prevents the production of flowers. The larger species, *T. laurifolia*, *T. affinis*, *T. grandiflora*, *T. mysorensis*, and *T. coccinea* are rapid growers, requiring plenty of feeding and root-room. All do better in open beds than in pots. They may be propagated either from seeds or by cuttings which are taken from the young wood which starts into growth after the plants have been cut back during winter. These produce few flowers the following autumn, but bloom freely the second season. As a rule, the plants flower in late summer or autumn, but the time of flowering may be made to vary according to treatment in some species. *T. alata* and its varieties and *T. fragrans* are often treated as annual garden plants, flowering in late summer. *T. erecta* and *T. affinis*, when grown in pots, form rather compact shrubby plants (see Gn. 24, p. 314; 30, p. 292; 47, p. 150). In Porto Rico *T. alata* has escaped and is common. Cook writes that there are two forms, one with corolla-limb cream-yellow and other whitish.

Thunbergias and allamandas are great favorites in central and southern Florida, being used on verandas,

3802. Thunbergia alata. (×½)

arbors, small trees, old stumps, trellises and buildings. Of the blue-flowered kinds *T. grandiflora* is hardiest and commonest. It has large heart-shaped leaves which overlap one another in a charming manner. It blooms from September until Christmas, the flowers being light blue and rather dull. The form of *T. laurifolia* known to the trade as *T. Harrisii*, has nearly sky-blue flowers, of a deeper but brighter hue than the preceding. It is a taller-growing and choicer plant, and has ten or more flowers in a raceme, while those of *T. grandiflora* are solitary in the axils. *T. fragrans* is the common white-flowered kind. The form cultivated in Florida is probably var. *vestita*, as the blossoms are not fragrant. *T. alata* is a general favorite. The flowers range from buff and white to orange with a deep purplish brown throat, the last form being the most popular. This species is killed to the ground by sharp frost every winter but sprouts vigorously the following spring. It also comes up from self-sown seed. This species grows only 7 to 8 feet high. All the thunbergias mentioned above are easily raised from cuttings or layers in summer. *T. erecta* is not a climber but has a somewhat straggling habit. It has small dark green leaves and large deep purplish blue gloxinia-like flowers which are white at the base. There is a pure white variety of it. It blooms all summer and autumn. It is readily raised from cuttings during the rainy season. (H. Nehrling.)

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KEY TO THE SPECIES.

A. *Fls. axillary, solitary.*
- B. *Lvs. entire* ..... 1. **affinis**
- BB. *Lvs. angularly toothed.*
  - C. *Petioles winged* ..... 2. **alata**
  - CC. *Petioles not winged.*
    - D. *Color of fls. white: corolla-lobes truncate and sinuately toothed at the apex* ..... 3. **fragrans**
    - DD. *Color of fls. blue (white only in varieties).*
      - E. *Plant erect or suberect.*
        - F. *Lvs. petiolate* ..... 4. **erecta**
        - FF. *Lvs. sessile* ..... 5. **natalensis**
      - EE. *Plant climbing.*
        - F. *Throat of the corolla yellow.* 6. **chrysops**
        - FF. *Throat of the corolla white.* 7. **grandiflora**

AA. *Fls. in terminal or axillary racemes (see, also, T. grandiflora).*
- B. *Color of fls. blue* ..... 8. **laurifolia**
- BB. *Color of fls. yellow* ..... 9. **mysorensis**
- BBB. *Color of fls. scarlet* ..... 10. **coccinea**
  11. **elegans**

1. **affinis,** S. Moore. A rambling shrub, 10–12 ft. high, smooth: branches 4-angled: lvs. short-petioled, elliptic, acute, entire: fls. 2 in. across, deep purple-blue, with a yellow throat. Summer. Trop. Afr. B.M. 6975. G.C. III. 2:461. G.M. 32:291.—This plant is closely allied to *T. erecta*, from which it differs by its entire lvs. and larger fls., which are about twice the size of those of *T. erecta*. When grown in a pot the plant forms a compact shrub, but when given more room it is a rambling climber.

2. **alàta,** Bojer. Black-eyed Susan. Fig. 3802. St. square, climbing, hairy: lvs. opposite, triangular-ovate, hastate, repand-toothed, rough-pubescent, tomentose beneath; petioles winged, about as long as the lvs.: fls. solitary, on axillary peduncles; calyx very small, surrounded by 2 large inflated bracts; corolla-tube somewhat longer than the involucre, dark purple within; limb rotate, oblique, of 5 rounded segms., buff or cream-colored. S. E. Afr. B.M. 2591. P.M. 2:2. B. 5:238 (not good). L.B.C. 11:1045. J.H. III. 48:11. G.L. 27:38.—A perennial climber which may also be treated as an annual greenhouse plant. Usually prop. by seeds. It is used either as greenhouse climber or to grow on trellises outdoors. Outside it flowers mostly in Aug., but by prop. at various times plants may be had in blossom nearly the whole year in the greenhouse. There are many varieties, some of which have been described as species.

Var. **álba,** Paxt. (*T. alàta* var. *albiflòra*, Hook.). Fls. white, with a blackish center. P.M. 3:28. B.M. 3512. Var. **aurantìaca,** Kuntze (*T. aurantiaca*, Paxt.). Fls. bright orange, with a dark center. The best of the group. P.M. 6:269. H.U. 1, p. 355. Subvar. **Dóddsii** has variegated lvs. P.M. 15:221. F.S. 4:415. Var. **Bàkeri,** Hort. (*T. Bàkeri* or *Bàckerii*, Hort.). Fls. pure white. Var. **Frỳeri,** Hort. (*T. Frỳeri*, Hort. *T. alàta* var. *intus-álba*, Hort.). Pale orange, with a white center. Var. **sulphùrea,** Hort. Fls. sulfur-yellow. Var. **lùtea,** Hort. (*T. alàta* var. *unícolor*, Hort.). Fls. entirely yellow.

3. **frà̀grans,** Roxbg. St. slender, climbing: lvs. lanceolate to triangular-ovate, cordate or subcordate, mostly angularly toothed on each side of the base, rough on both sides, petiolate: fls. white, axillary; corolla-tube narrow; limb spreading, 1½ in. across,

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lobes truncate and repandly toothed at the end. Summer. India.

Var. **lævis**, Clarke, is glabrous. B.M. 1881. L.B.C. 20:1913. G.C. III. 46:410. Var. **vestita**, Clarke, is more hairy and the fls. are not fragrant.

4. **erécta**, T. Anders. (*Meyènia erécta*, Benth.). Shrub, 2–4 ft. high, with loose spreading branches, half-erect: lvs. opposite, petiolate, ovate or subrhomboid, smooth, entire or sinuate-toothed: fls. solitary on axillary peduncles; calyx cut into 12–14 short teeth, concealed by the large bracts; corolla funnelform; tube curved, deep yellow within; limb purple, 1½–2 in. across, of 5 subrotund obcordate lobes. Trop. W. Afr. B.M. 5013. F.S. 11:1093. R.H. 1863:251. I.H. 3:99. F. 1855:225. J.H. III. 28:35; 49:261; 54:39.—A greenhouse shrub, producing fls. freely at almost any season. Grows in the open in Fla. Not a climber. Var. **álba**, Hort. Fls. white. Var. **cærùlea**, Hort. Fls. large, intense violet, with orange throat.

5. **natalénsis**, Hook. Plants erect, 2 ft. or more high, shrubby at base, green above: sts. quadrangular, mostly glabrous: lvs. somewhat crowded, opposite, sessile, ovate, acute or subacuminate, sinuate-dentate, glabrous above, hairy on the veins beneath: fls. large, pale blue, yellow in the throat, subhorizontal on erect peduncles which are shorter than the lvs.; tube of the corolla yellow, 2 in. long, curved upward, limb of 5 broad spreading obcordate lobes; calyx of 6 teeth. Natal. B.M. 5082. G.C. III. 37:162.—Very near *T. erecta*, which has petiolate lvs. and a greater number of calyx-teeth (if constant?).

6. **chrỳsops**, Hook. St. climbing, slightly hairy: lvs. opposite, petiolate, ovate-cordate, angularly toothed: peduncles axillary, solitary, 1-fld.: corolla funnelform or campanulate; tube yellow, limb purple, bluish around the throat. Sierra Leone. B.M. 4119. F.S. 1:5. P.M. 11:221. F. 1844:193.—Naturally a climber, but said to become somewhat erect if grown in a coolhouse.

7. **grandifl̀ora**, Roxbg. Fig. 3803. St. tall, climbing: lvs. broadly ovate, angularly cordate and toothed or lobed, somewhat roughened on both sides, petiolate: fls. solitary or in short, stout racemes in the lf.-axils, bright blue, becoming whitish in the throat; corolla-tube bell-shaped; limb 3 in. across, of 5 large, spreading rounded lobes. Bengal. B.M. 2366. P.M. 7:221. L.B.C. 4:324. B. 2:76. B.R. 495. Gn. 47:150. I.H. 42:32. G.C. III. 9:789.—A very large perennial greenhouse climber; flowers during the summer or autumn. There is also a white-fld. variety.

8. **laurifȯlia**, Lindl. (*T. Hárrisii*, Hook. *T. grandifl̀ora*, Wall.). St. terete, smooth except the youngest, twining: lvs. long-petiolate, ovate-oblong to oblong-lanceolate, acuminate, rounded at the base, smooth, entire or slightly toothed: fls. 3 in. across, pale blue, white or yellow in the throat, borne in axillary whorls or in a raceme in which they are clustered or whorled; corolla with a wide, oblique trumpet-shaped tube and a large 5-lobed limb. India. B.M. 4985; 4998. F.S. 12:1275. Gn. 12, p. 420; 30:292 and p. 293. R.H. 1860, p. 342. J.H. III. 28:345; 45:131. Gng. 3:295. G. 3:42, 43. G.W. 3, p. 45; 10, p. 180.—Perennial greenhouse climber, flowering profusely in winter. Prop. by cuttings.

9. **mysorénsis**, T. Anders. (*Hexacéntris mysorênsis*, Wight). Climbing shrub, with long, slender branches: lvs. opposite, petiolate, oblong-lanceolate, acuminate, entire or somewhat distantly toothed: racemes long, pendulous: fls. yellow, 2 in. across, the tube purple, inclosed by the spathe-like bracts; limb 4-lobed, the upper lip erect, concave, with reflexed side lobes, lower lip of 3 subequal, spreading lobes. India. B.M. 4786. F.S. 8:752. S.H. 2, p. 130. G.C. III. 40:356. J.F. 3:285. G.W. 3, p. 187.—A tall greenhouse climber which flowers, according to treatment, at all seasons.

Var. **lùtea**, Hort. (*Hexacéntris lùtea*, Hort., Veitch. G.C. 1854, p. 151, not *T. lùtea*, T. Anders.), has the fls. pure yellow; a variety with a crimson limb and yellow tube is figured in Paxton's Flower Garden, 3:88.

10. **coccínea**, Wall. (*Hexacéntris coccínea*, Nees). A very tall climber: st. much branched, 4-angled: lvs. short-petiolate, variously shaped, the lower broadly ovate, with a hastate or cordate angled base, the upper ovate, cordate, all angularly toothed or the upper entire: fls. in terminal or axillary racemes, 1–3 ft. long; bracts large, inflated, as long as the tube; limb scarlet, of 5 reflexed emarginate lobes; throat orange. Autumn and winter. India. B.M. 5124. L.B.C. 12:1195. F.S. 23:2447–48. R.H. 1890, p. 197. G.W. 3, p. 44.

11. **élegans**, Borzi. Resembles *T. coccinea*. The fls. are said to vary from red to intense yellow. Known only from plants in the Palermo Botanic Garden, to which it is supposed to have been intro. from a nursery in S. France.

T. Gibsonii, S. Moore. Sts. prostrate: lvs. about 1 in. long, triangular, glossy above: peduncles axillary, erect, 3 in. long: fls. solitary, about 1¼ in. across, yellow, each with a pair of inflated and united crimson-stained bracts. British E. Afr. B.M. 8604.—*T. primùlina*, Hemsl. Perennial, silky hairy at first:

3803. Thunbergia grandiflora. (×⅓)

lvs, rhomboid ovate, 1½–2½ in. long, with 1 small lobe on each side: fls. axillary, solitary, about 1½ in. across, resembling the common primrose in shape and color. E. Trop. Afr. B.M. 7969.—*T. Vogelìana*, Benth. (Meyenia Vogeliana, Benth.). Erect: lvs. large, ovate or oblong, dark green; fls. about equaling those of T. erecta, deep bluish violet with yellowish throat: handsome summer-flowering species. Fernando Po, Afr. B.M. 5389.

HEINRICH HASSELBRING.

THÙNIA (Count Thun-Tetschen, who had an important collection of orchids about the middle of the nineteenth century). *Orchidàceæ*. Tall plants with annual leafy stems terminating in a raceme of showy flowers.

Formerly united with Phaius, from which it differs by the terminal infl.: sepals and petals similar, spreading; labellum convolute over the column, spurred, ornamented with several crests consisting of lines of fleshy hairs; pollinia 8: fls. subtended by large membranous bracts.—About 6 species in N. India, Burma, and in the S. Himalaya region ascending to a height of 6,000 ft.

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The culture of the thunias is very simple. They begin growth naturally at the end of February or early in March. As soon as new growth is visible the plants should be given new material, consisting of fibrous peat or fern-root and sphagnum mixed with loam and some sand and potsherds for drainage. In their native home the plants are said to be epiphytic, and when treated as terrestrial orchids the native habit may be imitated by setting them well above the pot, which should not be too large. For the first four to six weeks until the young roots have made good growth, it is necessary to apply water sparingly. Thunias are very rapid-growing orchids and may be liberally supplied with liquid manure until the end of the flowering season, which occurs about the middle of August. Soon after this the leaves fall. The old stems winter in this condition and serve as food reservoirs for the young growth of the next season, but although they remain on the plant two years they form no leaves the second season. During the resting-period they should be kept in a rather

3804. Thunia alba. (×⅛)

dry atmosphere and be given only enough water to prevent the stems (pseudobulbs) from shriveling. This is one of the few orchids which can be profitably propagated by cutting the old stems into lengths of about 6 inches and rooting them in sand or sphagnum. When rooted the young plants may be potted in the usual way. A temperature of 60° to 65° is favorable during the growing season.

álba, Reichb. f. (*Phàius álbus*, Lindl.). Fig. 3804. Suberect, 2–3 ft., clothed with sheathing, oblong-lanceolate, striate lvs. 6 in. long: raceme drooping at the end of the st., 6–12-fld.: fls. white, 3–4 in. across when fully open; sepals and petals oblong-lanceolate, acuminate; labellum shorter than the segms., not manifestly 3-lobed, lateral lobes convolute over the column, apex spreading, wavy and finely crisp; color of labellum white veined with purple in the throat, with 5–9 purple or yellow fringed keels; wings of the column entire. April-Aug. Burma and S. Himalaya region. B.M. 3991. B.R. 24:33. P.M. 5:125. F.C. 3:125. R.H. 1874:450. Gt. 47, p. 233. G. 31:475.—There are several varieties of this species. The throat of the labellum is often yellow.

Bénsoniæ, Hook. f. (*Phàius Bénsoniæ*, Benth.). Sts. fascicled, 1–2 ft. high, leafy: lvs. linear-lanceolate, 8–10 in. long: fls. like those of *T. alba* but of a pale purple color; labellum large, 3-lobed, deep purple in front, with a yellow crested disk, with 6–7 rows of fringe-like golden yellow hairs; spur short, slender. India. July–Sept. B.M. 5694. G.M. 31:557. F.W. 1871:161.—The most showy species of the genus.

Marshalliàna, Reichb. f. (*Phàius Mársballiæ*, Nichols.). Closely related to *T. alba*. Sts. somewhat stronger: segms. pure white, acuminate: labellum evidently 3-lobed, with the lateral lobes surrounding the column, middle lobe wavy and crisp; color of labellum yellowish white, with 5 orange-fringed keels in the throat; wings of the column toothed. May–Aug. India. R.B. 21:229. S.H. 2, p. 335. Var. **ionophlèbia,** Reichb. f., has the center of the labellum bright yellow, paler toward the margin. Var. **álba,** Reichb. f., has white fls. with sulfur-yellow disk to the lip.

T. Veitchiàna=T. Bensoniæ × T. Marshalliana. Sepals and petals white, flushed light mauve at tips; front of lip mauve-purple, the base white, purple-lined. HEINRICH HASSELBRING.

THÙYA: *Thuja*.

THUYÓPSIS: *Thujopsis*.

THYMELÆA (Greek, *thyme* and *olive*, referring to the thyme-like foliage and the small olive-like fruit). *Thymelædceæ*. Hardy or half-hardy perennial herbs, subshrubs or small shrubs, which are very much branched: lvs. sparse, frequently small or narrow: fls. small, sessile and fascicled or solitary at the axils, hermaphrodite or polygamous by abortion; perianth urn-shaped or rarely, especially in male fls., with a slender cylindrical tube; lobes 4, spreading; stamens 8; ovary subsessile, 1-celled: fr. dry.—About 20 species, Medit. region, chiefly, also in Canary Isls., and in Asia. **T. hirsùta,** Endl. (*Passerìna hirsùta*, Linn.). Decumbent greenhouse or half-hardy shrub, 1–2 ft. high: sts. slender, fastigiate branched: lvs. coriaceous, ovate, nearly round or oblong, obtuse, 2–3 lines long, glabrous above, white-tomentose beneath: fls. white, in axillary or terminal few-fld. fascicles, which equal the lvs. July. Medit region. B.M. 1949. **T. Tartonraìra,** All. (*Dáphne Tartonraìra*, Linn. *Passerìna Tartonraìra*, Schrad.). Small hardy shrub, wholly silky-canescent, whitish or becoming fulvous: lvs. coriaceous, obovate or obovate-oblong, 5–10 lines long: fls. white, numerous, 2–5-glomerate in the upper axils. June. S. Eu.

F. TRACY HUBBARD.

THÝMUS (the old Greek name used by Theophrastus either for this plant or for savory). *Labiàtæ*. THYME. Small shrubs or subshrubs, mostly hardy, and excellent for edging and the rockery.

Leaves small, entire; floral lvs. similar or changing to bracts in the spike: floral whorls usually few-fld., sometimes all distant and axillary, sometimes gathered in terminal short or lax spikes; bractlets minute: calyx ovoid, 10–13-nerved, 2-lipped, 5-toothed; corolla-tube included or exserted, naked inside, limb somewhat 2-lipped; stamens 4, in pairs: nutlets ovoid or oblong, smooth.—About 120 species, broadly dispersed in temperate regions, although the greatest number are natives of the Medit. region.

Thymes are erect or prostrate plants with strong mint-like odor. Most of the species are grown as a ground-cover on banks, in borders, or rockwork. The creeping or prostrate habit, ability to persist in dry places and poor soils, and the colored or woolly foliage of some species make them adaptable to a variety of uses. The common *T. Serpyllum* is evergreen. *T. vulgaris* is the thyme of sweet-herb gardens, being prized in cookery. All thymes are easily propagated by means of division, although seedlings may sometimes be used to renew plantations of some of the species, particularly of *T. vulgaris*. Several names occur in American catalogues, all of which seem to be referable to three species, one of

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which is not a true Thymus. See *Sage*, where general culture of such herbs is given.

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KEY TO THE SPECIES.

A. *Floral lvs. similar to the cauline, narrower or scarcely broader, lax.*
B. *Sts. suberect, like a little shrub*..... 1. **vulgaris**
BB. *Sts. procumbent: flowering branches short-ascending.*
C. *Lvs. ovate, oblong, or elliptic.*
D. *Apex of lvs. acute*..... 2. **Herba-barona**
DD. *Apex of lvs. obtuse (usually broadly so).*
E. *Branches all ascending from the base: upper lip of corolla short and broad*..... 3. **Chamædrys**
EE. *Branches trailing at base, the flowering ones ascending: upper lip of corolla oblong.* 4. **Serpyllum**
CC. *Lvs. linear-subulate to linear-lanceolate.*
D. *Surfaces of lvs. tomentose*..... 5. **hirsutus**
DD. *Surfaces of lvs. glabrous.*
E. *Blades linear-subulate, nearly terete*..... 6. **pectinatus**
EE. *Blades linear-lanceolate, flat.* 7. **heterotrichus**
AA. *Floral lvs. much broader than the cauline, subimbricate.*
B. *Plants diffuse subshrubs with the flowering branches ascending.*
C. *Lvs. subterete*..... 8. **carnosus**
CC. *Lvs. flat.*
D. *Surfaces of lvs. villous: lvs. linear*..... 9. **villosus**
DD. *Surfaces of lvs. glabrous: lvs. usually subspatulate*.....10. **striatus**
BB. *Plants suberect little shrubs with the flowering branches rigid and erect: heads, dense, cone-like*.....11. **capitatus**

1. **vulgàris,** Linn. COMMON THYME. Subshrub, erect, 6 in. high: sts. sometimes decumbent at base: branches stiff and woody, usually white-pubescent: lvs. sessile, 3–6 lines long, linear- or ovate-lanceolate, fascicled at the axils; floral lvs. lanceolate, obtuse: floral whorls lax interrupted spikes: fls. small, lilac or purplish, calyx-teeth of upper lip lanceolate, of lower subulate. S. Eu. —An old garden plant, being grown as a sweet-herb. The lvs. and shoots are used for seasoning. It is well to renew the plants from seeds every 2 or 3 years. There are varieties with broad and narrow lvs.

2. **Herba-barona,** Loisel. Subshrub, much branched, procumbent, glabrous below: flowering branches shortly ascending, 3–5 in. high: lvs. short-petioled, ovate-lanceolate, acute, base rotundate, viscid-glandular; floral lvs. rather similar: floral whorls approximate and capitate: fls. purplish; calyx white-pilose and red, glandular, upper lip trifid, lower teeth of calyx subulate and ciliate-barbed; corolla-tube slightly exserted. Corsica.

3. **Chamædrys,** Fries. Subshrub, low, forming a tuft: sts. diffuse, ascending: lvs. broad-oblong; petioles ciliate; floral-lvs. similar: fls. whorled or capitate, purple; calyx-teeth of upper lip 3, triangular, of lower lip 2, subulate. N. Eu.—Similar to *T. Serpyllum* and by most considered a form of that species, but said to differ in having the lvs. less narrowed to the petiole and only the petiole ciliate; also the lvs. are less prominently veined.

4. **Serpyllum,** Linn.; also spelled *Serpyllus* (*T. azóricus*, Lodd. *T. hirsùtus*, Auth. not Bieb. *T. micans*, Lowe). MOTHER OF THYME. CREEPING THYME. Perennial or subshrubby, cespitose or creeping: sts. wiry, prostrate and rooting below, ascending-erect above, slightly puberulent: lvs. elliptic, oblong or ovate, obtuse base more or less attenuate, seldom ½in. long, short-petioled: floral-whorls sessile, congested into a head or the lower more or less distant and racemose: fls. minute, lilac or rose; calyx more or less hairy, 2-lipped to the middle, teeth of upper lip triangular, glabrous or ciliate, of lower lip 2, lanceolate-subulate, ciliate; corolla-tube rather included. Temperate parts of Eu., Asia, and N. Afr. G.M. 57:807. L.B.C. 16:1530.—A common plant in old gardens, prized as an evergreen edging and as cover for rockwork and waste places; also run wild. The lvs. are sometimes used for seasoning, as are those of *T. vulgaris*. The nodes are short, making it a very leafy plant. Variable. Var. **álbus,** Hort., is a white-fld. form. Gt. 45, p. 108. Var. **argénteus,** Hort., is a form with silver variegated lvs. commonly known in the trade as *T. citriodòrus argénteus*, Hort. Var. **aùreus,** Hort., is a form with golden variegated lvs. growing about 8–12 in. high; usually known in the trade as *T. aùreus*, Hort., or *T. citriodòrus aùreus*, Hort.; there is also a minor variation known in the trade as *T. Serpýllum aùreus marginàtus*. Var. **Chaubárdii,** Boiss. & Heldr., see *T. heterotrichus*. Var. **citriodòrus,** Hort., see var. *vulgaris*. Var. **coccíneus,** Hort. (*T. coccíneus*, Hort.), grows about 1½–3 in. high, has dark green lvs. and bright crimson fls. Var. **lanuginòsus,** Hort. (*T. lanuginòsus*, Mill. *T. Chamædrys lanuginòsus*, Hort.), is a low form, about 3 in. high with small roundish lvs. which are gray-pubescent; a good edging plant. Var. **montànus,** Benth. (*T. montànus*, Waldst. & Kit. *T. Chamædrys*, Auth., not Fries), is a form with the branchlets more erect and the lvs. larger than the type. Var. **pulchéllus,** Hort., has the upper part of the calyx and its teeth purple. G.M. 56:83. Var. **splèndens,** Hort., is a form with brilliant red (according to some bright purplish red) fls. Var. **variegàtus,** Hort., has white-variegated lvs., possibly the same as var. *argenteus*. Var. **vulgàris,** Benth. (*T. Serpýllum* var. *citriodòrus*, Hort. *T. citriodòrus*, Schreb.). LEMON THYME. Lvs. smaller than the type and strongly veined; the plant has a decided lemon odor.

5. **hirsûtus,** Bieb. Perennial or subshrub, cespitose and cushioned or procumbent: flowering branches ascending, hoary-pubescent: lvs. not punctate, sessile or nearly so, linear-subulate, obtuse, both surfaces hoary-tomentose, margin ciliate: fls. closely approximate in an oblong head, rose; calyx reddish, hirsute, 2-lipped below the middle, teeth of upper lip lanceolate, acuminate, of lower subulate; corolla-tube included. S. E. Eu. and Caucasus.

6. **pectinàtus,** Fisch. & Mey. (*T. odoratíssimus*, Bieb., not Mill.). Perennial, bush-like: young branches slender, erect, leafy: lvs. glandular-punctate, linear-subulate, obtuse, fascicled at the axils; floral lvs. similar: fls. pale purple, in heads; calyx equally 2-lipped almost to the middle, teeth of upper lip lanceolate, rather acute, of lower subulate; corolla-tube included. S. Russia and Asia Minor. G.M. 56:82. Gn. 78, p. 134.—Very closely related to *T. Serpyllum*. Strongly fragrant.

7. **heterótrichus,** Griseb. Subshrub, 3–6 in. high: branches ascending, puberulent: lvs. 6–8 lines long, linear-lanceolate, rather obtuse, fascicled in the axils, flat, glabrous; floral lvs. similar: floral whorls approximate in a head-like raceme: fls. pale violet; calyx pilose, upper lip trifid to the middle, its segms. lanceolate-acuminate. Greece and Macedonia. G.W. 12, p. 461.—Treated by some authors as *T. Serpyllum* var. *Chaubardii*, Boiss. & Heldr.

8. **carnòsus,** Boiss. Subshrub, about 9 in. high: sts. decumbent at base, otherwise erect, white-pubescent: lvs. minute, fascicled, strongly revolute, fleshy, subterete, oblong, obtuse, glandular-punctate, glabrous,

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glaucous; floral lvs. ovate, with revolute margins, hirtellous: heads dense, ovate: fls. white; calyx hirtellous, upper lip 3-toothed to hardly the middle, margin revolute; lower lip with bristle-like teeth. Portugal.

9. **villòsus,** Linn. Subshrub, about 3 in. high: sts. much branched, erect, pubescent: lvs. narrow-linear, acute, ciliate, fascicled at the axils; floral lvs. broadly ovate, acuminate, villous: floral whorls in an ovate-globose spike: fls. purplish crimson; calyx villous, teeth of upper lip short, ovate-lanceolate, of lower subulate. Portugal.—Some of the material offered in the trade under this name may be a form of *T. Serpyllum.*

10. **striàtus,** Vahl (*T. Zygis,* Sibth. & Smith, not Linn.). Subshrub, about 3 in. high: branches woody, procumbent; flowering branchlets erect, somewhat hirsute: lvs. stiff, sessile, linear or subspatulate, glabrous, more or less ciliate beneath; floral lvs. broadly cordate-ovate, striate and pubescent: fls. congested in a dense, ovate head with the uppermost lvs. forming an involucre, white (purple?); calyx-teeth lanceolate; corolla-tube rather included.

11. **capitàtus,** Hoffmgg. & Link (*Coridothymus capitàtus,* Reichb. f.). Subshrub, 6 in. to about 1 ft. high: branches stout and erect, sterile branches finally spiny: lvs. stiff, linear, very short, rather 3-sided: head ovate, dense, cone-like: fls. rose; calyx compressed at the margins, teeth ciliate; corolla-tube short-exserted. Medit. region.—Treated as a distinct genus, *Coridothymus capitatus,* by Briquet in Engler & Prantl, Pflanzenfamilien IV. 3a.

T. córsicus, Pers.=Satureia corsica.—*T. erectus,* Hort., is offered in the trade as a small shrubby evergreen about 9–12 in. high, with a rigid habit and clusters of rose or pale pink fls.—*T. ericæfòlius,* Roth=Micromeria varia, Benth. Subshrub, procumbent, pubescent or villous: lvs. sessile, lower ovate, upper lanceolate, somewhat canescent beneath: fls. minute, sessile in a sessile or peduncled fascicle; calyx usually purplish. Canary Isls.

F. Tracy Hubbard.

THYRSACÁNTHUS (Greek, *thyrse* and *flower*). *Acanthàceæ.* Erect, glabrous, pubescent or villous herbs, which are adapted to the warmhouse. Lvs. opposite, entire, usually large: fls. red, fascicled at the bract-axils, pedicelled; fascicles or cymes arranged in a terminal thyrsoid, simple raceme or paniculately branched; calyx short, rather 5-parted, segms. narrow, acute or acuminate; corolla-tube elongate, straight or somewhat incurved, limb somewhat 2-lipped, 4-cleft; stamens 2, staminodia 2; disk rather thick: caps. oblong; seeds 4 or fewer by abortion.—About 23 species, Trop. Amer. The oldest and now accepted name of the genus is **Odontonema.**

3805. Odontonema (Thyrsacanthus) Schomburgkianum. (×½)

O. Schomburgkiànum, Kuntze (*Thyrsacánthus Schomburgkiànus,* Nees. *T. rùtilans,* Planch.). Fig. 3805. A shrubby plant, becoming 6 ft. high: lvs. oblong-lanceolate, nearly sessile: racemes 8–10 in. or even 3 ft. long from the upper axils, slender, drooping: fls. tubular, red, about 1½ in. long, pendulous. Dec.–March. Colombia. B.M. 4851. R.H. 1852:160. Gn. 42, p. 482; 69, p. 209. F.S. 7:732. G. 20:177; 36:177. G.W. 4, p. 352; 11, p. 196.

O. callistàchyum, Kuntze (Thyrsacanthus callistachyus, Nees. T. lilacinus, Lindl. Justicia lilacina, Hort.). Shrub, 2 ft. high: lvs. oblong, petioled, tomentose: fls. red; sepals pubescent, bristly-acuminate; corolla glabrous. Mex. J.F. 2:165.

F. Tracy Hubbard.

THYRSÓPTERIS (Greek, *bunch* or *raceme* and *fern;* the fructification is disposed in racemose bunches). *Polypodiàceæ.* Tree-like fern: lvs. decompound, the fertile portions appearing like bunches of stipitate acorn-cups, the sterile portions twice-pinnate and then deeply pinnatisect. One species, Isl. Juan Fernandez, *T. élegans,* Kunze. Tree fern about 15 ft. high: lvs. decompound, reaching a length of 5–6 ft., one-third of which is naked; sterile portions bipinnate, with lanceolate incised pinnules; fertile parts tripinnate, each pinna becoming a raceme of stalked involucres: sori globose; involucre cup-shaped.

THYRSÓSTACHYS (Greek, *thyrse* and *spike*). *Gramíneæ.* A genus of 2 species of arborescent bamboos native to Upper Burma and Siam, which has been referred to Rottboellia but is probably sufficiently distinct. The st.-sheaths are long, thin and persistent, with a long narrow blade. The lvs. are small or moderate-sized. *T. siaménsis,* Gamble, is a tender, deciduous, "giant bamboo," with very graceful tufted sts. 25–30 ft. high and 1½–3 in. thick: st.-sheaths waved and truncate at the top, 9–11 x 4½–8 in.; auricles short-triangular: blade narrowly triangular: lvs. small, narrow, linear, 3–6 x ⅓–½in. Siam.—Once intro. in S. Calif., but it did not persist. Probably not now in cult. in this country outside test-grounds.

THYSANÒTUS (Greek, *fringed* and *ear,* alluding to the 3 inner perianth-segms. which are fringed). *Liliàceæ.* Perennials, suitable for the greenhouse. Rhizomes sometimes very short, sometimes stout and horizontal: lvs. radical, grass-like, flat or terete: scapes leafless, now erect and simple or paniculate above, now much branched or in one species twining: fls. sometimes densely fascicled, with 1 terminal fascicle or few at the top of the scape, sometimes variously panicled; perianth withering, persistent, segms. distinct, outer narrow, margin entire, inner with a broad colored margin, beautifully fimbriate-ciliate; stamens 6; ovary sessile or short-stipitate, 3-celled: caps. globose or ovoid.—About 21 species, Austral., one of which is also found in the Philippines and China. The difference in the inner and outer stamens and the absence of the latter in some species may not always be as constant as it would appear at first sight. The following species have been occasionally cult. They thrive in sandy loam and may be increased by offsets.

T. dichótomus, R. Br. (T. intricatus, Lindl. T. tenuis, Lindl., not Endl.). Rhizome thick; sts. very variable, sometimes erect, branched, 1–2 ft. high, rarely almost twining: lvs. radical, few, short: fls. 1 or 2, rarely 3, in terminal umbels; perianth-segms. purple; stamens 6. B.R. 24:50; 26:4. J.F. 4:402.—*T. júnceus,* R. Br. Rhizome thick: sts. slender, loosely branched, erect or flexuous, 1–2 ft. high: lvs. radical, few, narrow-linear, short: fls. 1–3, in terminal umbels and sometimes 1 or 2 sessile along the lower branches; perianth-segms. purple, 5–6 lines long; stamens 6. B.M. 2351. B.R 656.—*T. multiflòrus,* R. Br. Rootstock densely tufted: lvs. all radical, densely tufted, erect, rigid, much shorter than the scape: scapes simple, 6–18 in. high, bearing a single terminal, many-fld. umbel or rarely a second one lower down: perianth-segms. purple, the outer very acute, inner rather shorter; stamens 3. Var. *prolífer,* Hort. (T. proliferus, Lindl.), is a luxuriant form, with a large terminal umbel, frequently a second rather lower down: the lvs. sometimes exceeding the scape. B.R. 24:8. F.S. 18:1911.—*T. tuberòsus,* R. Br. (T. elatior, R. Br. T. isantherus, Lindl., not R. Br.). Roots swollen into tubers: lvs. radical, not numerous, narrow-linear, as long as the scape which is erect, rigid, terete and 6–12 in. (or more) high, branching into a loose, irregularly dichotomous panicle, each branch bearing a terminal 1–4-fld. umbel and sometimes a lateral sessile one: perianth purple, sometimes 6–7 lines long; stamens 6. B.R. 655.

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TIARÉLLA (Latin, *a little tiara* or *turban;* in reference to the form of the pistil). *Saxifragàceæ.* FALSE MITREWORT. Slender erect hardy perennial herbs, useful for the wild-garden or anv shaded spot.

3806. Tiarella cordifolia. (×¼)

Leaves several, radical, long-petioled, simple or 3-foliate; stipules small, adnate to the petiole: raceme terminal, somewhat bracteate, simple or compound: fls. white or reddish; calyx-tube short, lobes 5, ovate; petals 5, entire; stamens 10; ovary superior, compressed, 1-celled: caps. membranaceous, 1-celled, 2-valved.—About 8 species, 1 from Japan, 1 from the Himalayas, the remainder from N. Amer. These plants are little grown, but they are useful for colonizing or perhaps for the rock-garden and are particularly attractive in the autumn on account of their brilliant lf.-coloring. Prop. by division.

A. *Lvs. simple.*

B. *Petals oblong.*

cordifòlia, Linn. FOAM-FLOWER. Fig. 3806. A handsome native perennial, forming a tufted mass, 6–12 in. high, of broadly ovate lobed and serrate lvs. and simple erect racemes of white fls. borne well above the foliage in May. Fls. about ¼in. across; petals oblong, clawed, somewhat exceeding the white calyx-lobes. In rich, moist woodland, Nova Scotia to Ont., south to Ga. Gn. 22, p. 21; 32, p. 511; 53, p. 456; 55, p. 40; 66, p. 87. V. 11:35. G.L. 26:153. C.L.A. 4:340. G. 6:27; 10: 144; 12:127; 17:464. Gn.M. 1:188. Gn.W. 21:893. J.H. III. 54:423.—An elegant plant well worthy of general cult. It is a lover of cool shaded places and of rich moist soil. It will do well, however, in ordinary soil and flower freely in a half-shaded place, but the varied lf.-markings of bronzy red and other signs of luxuriance are not brought out to their fullest extent except with moisture, coolness and a fairly rich soil. The plant forces well and easily in a coolhouse for early spring flowering. It is tenacious of life and generally easy to manage. Var. **albiflòra,** Hort., is a fine white-fld. form. Var. **purpùrea,** Hort. (*T. purpùrea,* Hort.), is a purple-fld. form, of which the following variations are also offered in the trade: *purpùrea màjor,* with salmon-rose or wine-red fls.; *purpùrea màjor compácta,* a more compact grower with bronzy chamois-colored fls.; *purpùrea marmoràta,* with very attractive bronze foliage passing to blackish green and marbled with purple: fls. very numerous, maroon.

BB. *Petals filiform, inconspicuous.*

unifoliàta, Hook. Hardy perennial: lvs. thin, rounded or triangular, 3–5-lobed, the lobes crenate-toothed; st.-lvs. usually only 1, rarelv 2–3: panicle loose; petals small. W. Amer.—The lobing of the lvs., according to Bot. of Calif., varies so that it may pass into the next species.

AA. *Lvs. 3-foliolate.*

trifoliàta, Linn. Resembling *T. unifoliata* except in having 3-foliolate lvs. Ore. to Alaska, also N. W. Asia.

T. biternàta, Vent.=Astilbe biternata.

F. W. BARCLAY.
F. TRACY HUBBARD.†

TIBOUCHÌNA (native name in Guiana). Including *Pleròma. Melastomàceæ.* Shrubs or subshrubs, rarely herbs, sometimes climbing, usually strigose-pilose or hispid, adapted to the warmhouse or to out-of-doors in the extreme South.

Leaves usually large, leathery, petioled, ovate or oblong, entire, 3–7-nerved: fls. generally in trichotomous terminal panicles, large, violet or purple, rarely 4-merous; calyx hirsute or strigose, tube ovoid, campanulate, urn-shaped or elongated, lobes 5, subulate, lanceolate or oblong; petals 5, obovate; stamens 10; ovary free or adhering toward the base to the 5 calyx-ribs, 5-celled: caps. 5-valved.—About 215 species, Trop. Amer., but chiefly from Brazil.

Tibouchinas are among the handsomest of our intermediate greenhouse plants, and can be readily trained in bush form, probably with the exception of *T. semidecandra,* which is better adapted as a pillar or trellis plant. These plants may be propagated at any time of the year, but early spring is the best season. Small pots should be half filled with sandy loam, the remainder being all sand and the cuttings inserted singly. They should be kept quite close and fairly moist, and they will root in a few weeks. After they are rooted, place them in a greenhouse with a night temperature of about 55°, allowing a rise of 20° in the middle of the day. Pinch the heart out as soon as they begin to grow, and a few days after they have been cut back, move them into a pot about 3 inches larger. A good fibrous loam may now be used for all future pottings, and as the plants get stronger about a third of sheep-manure may be added, also a little sharp sand and charcoal, to keep the soil sweet and porous. Give plenty of light at all times, but avoid strong sunshine. Give plenty of water, and syringe the under side of the foliage to prevent red-spider, which is about the only insect that is trouble-

3807. Tibouchina semidecandra. (×⅛)

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some. Never allow the plants to become pot-bound until the size desired for flowering is attained. Give strict attention to keeping the plants in shape, by pinching the strong shoots. and tying them to the outer edge of the plants, allowing the weaker ones to grow, and fill up the middle of the plant. In summer the plants may be placed out-of-doors, and plunged to the rim of the pot, in a bed of ashes; but never allow the sun to strike them directly, as it will disfigure the foliage. These plants are excellent for exhibition purposes and conservatory decoration. The species *T. elegans* and *T. semidecandra* are worthy of general cultivation. (George F. Stewart.)

semidecándra, Cogn. (*Lasiándra macrántha*, Lind. & Seem. *Pleròma macránthum*, Hook.). Fig. 3807. A tender shrub: lvs. ovate or oblong-ovate, 2–6 in. long, round at the base, short-petioled, densely setose above, villous beneath, not foveolate, 5-nerved or 3-nerved: bracts broadly suborbicular, somewhat rounded at the apex and shortly apiculate, margin not translucent: fls. reddish purple to violet, often 5 in. across, solitary and terminal or 1 fl. terminal and 2 in the upper axils on the branchlet; stamens purple; style setulose. Brazil. B.M. 4412 (as *P. Kunthianum*); 5721. F.S. 23:2430. Gn. 44:120. F. 1868:193. I.H. 16:594. G. 29:34. G.W. 7, p. 390. G.Z. 15:1. J.H. III. 42:219. H.F. II. 10:72. Var. **floribúnda** is more suited to pot cult. and flowers more freely than the type when small. *Lasiándra*, or *Pleròma splèndens*, Hort., should be compared with this. The fls. of *T. semidecandra* last but a day or so, but the flowering season lasts for several weeks. Plants may also be used for summer bedding. They are seldom out of bloom. The species is much esteemed in Fla., where it makes a showy shrub 8 ft. high. It endures a few degrees of frost with impunity, and even if cut down it sprouts readily.

élegans, Cogn. (*Pleròma élegans*, Gardn.). Tender shrub, 3–6 ft. high: lvs. rigid, fragile, oblong or ovate-oblong, 3-nerved: fls. purple, 1½ in. across; calyx more or less armed with rigid spreading bristles which are thickened at the base. Brazil. B.M. 4262. P.M. 15:27. F.S. 12:1212 (as *Lasiandra elegans*). H.F. 3:24.

There is a plant offered in the trade under the name of *Pleròma cándidum*, Hort. Bull, described as being a shrub with dark green ovate-lanceolate lvs., densely silky-hairy, the 5 longitudinal veins very prominent beneath: fls. snowy white, about 1½–1¾ in. across, borne in loose terminal heads. Said to have been intro. from S. Austral. As there are no Tibouchinas known outside of S. Amer. it is not likely that this is correctly placed in Pleroma; the proper identification of the plant is at present impossible.—*T. lepidòta*, Baill. (Lasiandra lepidota, Naud.), is a plant which has been much confused and is still uncertain. F.W. 1874:289.—There is a plant at least formerly cult. under the name of *Pleròma sarmentòsum*, Hook. Small villous shrub with the branches and branchlets sarmentose: lvs. short-petioled, ovate or oblong, acute, base rounded or cordate, 7-nerved, pilose: fls. blue, about 2 in. across; calyx-tube obovoid or subglobose, densely tomentose; petals cuneate-obovate. Peru. Its position and name in Tibouchina are uncertain. B.M. 5629. F.W. 1869:225.—*T. stenocárpa*, Cogn. Shrub with acutely 4-angled branches which are sometimes somewhat winged: lvs. short-petioled, usually oblong, base generally short-attenuate, 5-nerved, silky villous: fls. many in a terminal panicle, usually rather large, purple or violet-purple; calyx-tube campanulate; petals narrowly obovate-cuneate. Brazil. F. TRACY HUBBARD.†

TIEDEMÁNNIA: *Oxypolis.*

TIGER-FLOWER: *Tigridia.* **T. Lily:** *Lilium tigrinum.*

TIGRÍDIA (*tiger-like*, referring to the peculiarly marked flowers). *Iridàceæ*. Bulbous plants, grown in the greenhouse and also making very showy summer-blooming subjects.

Bulbs tunicated: st. erect, mostly unbranched, 1–2½ ft. tall, with a few narrow plicate lvs. at the base and 2 or 3 smaller ones higher up: spathes 1 or 2, leaf-like, each bearing 1 or few blossoms: fls. in shades of yellow, orange or purplish, variously spotted, often very showy; perianth wide-spreading, with no tube, the segms. 6, in 2 dissimilar series, connivent into a broad cup at the base; stamens 3, the filaments united into a long cylindrical tube including the style; pistil with 3-loculed ovary, long style with 3 2-parted branches.—About 13 species from Mex., Cent. Amer., Peru, and Chile. *T. Pavonia*, from S. Mex., was in cult. in Eu. in the 16th century. L'Obel described it in 1576. The younger Linnæus referred it to the genus Ferraria, and some of the tigridias are yet cult. under that name. Ferraria, however, is a S. African genus, and all the parts of the perianth are nearly equal. *T. Pavonia* is cult. in many forms, and is the only common species in gardens. The fls. of all tigridias are fugitive, lasting only for a day.

Tigridias are tender "bulbs" requiring the treatment given gladiolus. Plant in well-prepared soil when settled weather comes, 2 to 3 inches deep and 4 to 8 inches apart. The principal blooming period is July and August. Allow the corms to remain in the ground until danger of frost approaches, then store in a dry place where dahlias or gladioli will keep. See that the corms are dry before being placed in storage. Propagation is by cormels and seeds. The best colors are secured in warm weather.

3808. Tiger-flower.—Tigridia Pavonia. (×¼)

A. *Fls. large (often 4 in. or more across); the 2 rows of perianth-segms. very dissimilar; stigmas decurrent. (Tigridia proper.)*

Pavònia, Ker-Gawl. TIGER-FLOWER. SHELL-FLOWER. Fig. 3808. Erect, usually unbranched, 1½–2½ ft. tall, glabrous, with several sword-shaped, strongly plicate long-pointed lvs., the spathe-lvs. 3–5 in. long: fls. produced in succession through the warm season, very large and showy, in some forms 5–6 in. across, oddly marked, with a cup-shaped or saucer-shaped center and wide-spreading limb formed by the obovate outer segms. which are bright red on the limb, and purple, yellow, or red-spotted on the claw; inner segms. panduriform (fiddle-shaped), about half the length of the outer ones, the blade ovate-acute, orange-yellow, and copiously spotted. Mex. and Guatemala. B.M. 532 (as *Ferraria Tigridia*). I.H. 38:142. G.C. III. 55, suppl. Feb. 21. Gn. 64, p. 56. G.W. 11, p. 290; 14, p. 674. R.B. 26:73. Var. **conchiflòra,** Hort. (*T. conchiflòra*, Sweet), has bright yellow fls. Var. **Wátkinsonii,** Hort. (var. *aùrea*, Hort. *T. conchiflòra Wátkinsonii*, Paxt.). Raised from seeds of var. *conchiflora* pollinized by *T. Pavonia*, before 1840, by J. Horsefield, Manchester, England. Horsefield is quoted as follows by Paxton: "In habit and strength this hybrid resembles *T. Pavonia*, the male parent; but in color and the markings of the flower it resembles *T. conchiflora*, the female parent; the large outer sepals, however, are of a very deep yellow, inclining to orange, and sometimes elegantly streaked with red lines; whilst the spotted center equals, if not surpasses, the brilliancy of either of the species. One of its greatest merits is being so free a bloomer, and as easy to cultivate and increase as *T. Pavonia*, whereas *T. conchiflora* is rather delicate, increases slowly, and is easily lost." Dutch bulb-dealers may still offer it. P.M. 14:51. Var. **álba,** Hort., has white fls., with red spots in the throat. G.L.

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26:128 (as *T. alba*). Var. **álba immaculàta,** Hort., is a spotless white variety, a sport from var. *alba*. Gn. 49, p. 361. Var. **flàva,** Hort., has pale yellow fls. with red-spotted center. Gn. 50:22. Var. **canariénsis,** Hort., is also a pale yellow-fld. form, but named as if an inhabitant of the Canaries. Var. **lùtea immaculàta,** Hort., has pure yellow spotless fls. Var. **ròsea,** Hort., has rose-colored fls. with yellow variegated center. Var. **lilàcea,** Hort., has lilac fls. with spotted center. Gn. 45:26. Var. **speciòsa,** Hort., is a partially dwarf form with deeper red color, the interior of the cup being similar in color to the limb. Described in 1843. G. 36:359. Var. **grandiflòra,** Hort., has fls. much like those of *T. Pavonia* itself except that they are larger and brighter colored. Gn. 45, p. 263. G. 1:20; 6:263 (as *T. grandiflora*). Identical with this, or subtypes of it, are the forms known as *Wheeleri, coccinea, splendens*. Most of the marked departures in colors of *T. Pavonia* are recent. In catalogues the above names often appear as if they were species names.

3809. Tigridia Pringlei. (×⅓)

Pringlei, Wats. Fig. 3809. Distinguished by Sereno Watson, the author of the species, as follows: "Very closely related to *T. Pavonia*, and if color alone were to decide, it might be considered a variety of it, though differing markedly even in that respect from the old species. The base of the sepals is blotched (rather than spotted) with crimson, with a border of orange, the reflexed blade being of a bright scarlet-red. The petals have the base blotched and coarsely spotted with crimson, with a well-defined, deeper-colored, brownish margin, the blade orange, tinged with scarlet, but not at all spotted as in *T. Pavonia*. The more essential difference is in the form of the petals, which have a broadly cordate or reniform base, with a much narrower small triangular-ovate acute blade. The sepals are also smaller and more oblong in outline." N. Mex. G.F. 1:389 (adapted in Fig. 3809). B.M. 7089.

AA. *Fls. relatively small; the 2 rows of segms. differing less in size; stigmas capitate, or at least not strongly decurrent.* (*Subgenus Beatonia.*)

buccífera, Wats. Fig. 3810. About 1 ft. high, slender, branching, glaucous: lvs. very narrow, strongly plicate: fl. 2 in. across, the cup pale greenish yellow, dotted with purple, the obovate obtuse blade of the outer segms. light purple; inner segms. "folded together in such a manner as to form a sunken longitudinal tube down the center, the dilated sides at the outer end of the tube approaching each other in the form of 2 cheek-like prominences,—these are colored white, purple, and yellow, while the small rounded terminal blade is a deep purple." Mountains of Jolisco, Mex. G.F. 2:413 (adapted in Fig. 3810).—Offered in 1889 by Horsford.

T. aùrea, Hort., is Cypella plumbea.—*T. cælèstis*, Hort., is Cypella plumbea.—*T. Houttei*, Roezl, is Hydrotænia Van Houttei.—*T. Meleàgris*, Hort., is also a Hydrotænia (H. Meleagris, Lindl.), but is not in the American trade. B.R. 28:39.—*T. violàcea*, Schiede. & Schlecht. One of the Beatonia section: slender, narrow-lvd.: fls. 2 in. across, violet, spotted at the base; inner segms. small, cusp-pointed. Mex. B.M. 7356. H.U. 3, p. 301. Other kinds of Tigrida are likely to appear in cult.

L. H. B.

TÍLIA (the classical Latin name). *Tiliàceæ*. LINDEN. LIME. BASSWOOD. WHITEWOOD. Ornamental trees, grown for their handsome foliage, good habit, and also for their fragrant flowers.

Deciduous: winter buds large, obtuse, with several imbricate scales, terminal bud wanting: lvs. alternate, petioled, usually cordate, serrate, with caducous stipules: fls. small, in long-peduncled drooping cymes; the peduncle for about half its length adnate to a membranous ligulate bract; sepals 5; petals 5, often with 5 opposite petaloid staminodes; stamens many, with the filaments forked at the apex; ovary superior, 5-celled; style slender, with 5-lobed stigma: fr. globose or ovoid, nut-like, usually with 1–3 seeds.—About 25 species throughout the temperate regions of the northern hemisphere, in N. Amer. south to the highlands of Mex., except W. N. Amer., and in Asia south to Cent. China. The names of the lindens, and particularly of those in cult., have been much confused, owing to the great variability of some species, the rather slight differences between many of the species and to the presence of many hybrids originated spontaneously and in cult. The light-colored soft and light wood is easily worked and much used for the interior finish of houses, for wood-carving, wooden baskets and other small wooden ware. The tough inner bark is used as a tying material and, particularly in Russia, in the manufacture of mats, cords, shoes, and other articles. The fls. yield large quantities of nectar and afford an excellent bee pasture, except *T. tomentosa* and *T. petiolaris*, which are poisonous to bees.

3810. Tigridia buccifera. (×nearly ½)

The lindens are very desirable trees of comparatively rapid growth and regular pyramidal habit while young, with slender-stalked medium-sized or rather large leaves and with small yellowish fragrant flowers in

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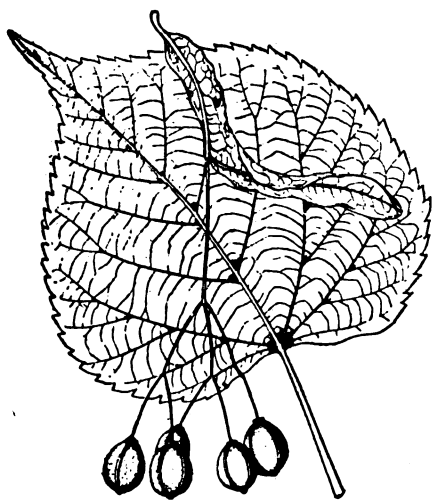
drooping clusters followed by small inconspicuous nutlets. The species in cultivation are nearly all hardy North and not particular as to the soil, but do not thrive well in dry locations or in dry climates. They are much planted as shade and ornamental trees and, particularly in Europe, are favorite avenue and street trees. The best for avenue planting are *T. tomentosa*, *T. euchlora*, *T. americana*, *T. cordata*; *T. tomentosa* stands heat and drought better than any of the others, while *T. platyphyllos*, although often planted for its rapid growth, is likely to suffer in dry seasons or in dry localities.

Propagation is by seed which must be sown soon after ripening or stratified, as it does not germinate until the second year if kept dry and sown in spring. Also increased by layers; in layering usually the method of



3811. Tilia platyphyllos. (×⅔)

"stooling" is employed; this consists of cutting a younger tree close to the ground and of laying down and covering partly with earth the numerous shoots which will appear. Varieties or rarer species are often grafted in spring or budded in August on common stock. Plants raised from layers or grafts remain often one-sided for many years, as the lateral branches usually employed for propagation have the tendency to grow horizontally instead of strictly upright.

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KEY TO THE SPECIES.

A. *Lvs. green or glaucous beneath, glabrous or pubescent with simple hairs.*
B. *Under side of lvs. and branchlets pubescent: fls. without staminodes* . . . 1. **platyphyllos**
BB. *Under side of lvs. glabrous except axillary tufts of hairs.*
C. *Axillary tufts present at the base of the lf. and elsewhere.*
D. *Margin of lvs. finely serrate: fls. without staminodes.*
E. *Lvs. green beneath; the tertiary veins prominent.*
F. *Upper surface of lvs. dull green, margin with short-pointed teeth* . . . . . 2. **vulgaris**
FF. *Upper surface glossy dark green, margin with long-pointed teeth* . . . . . 3. **euchlora**
EE. *Lvs. glaucous beneath; the tertiary veins not prominent.*
F. *Cymes 5–11-fld.: fls. without staminodes* . . . . . 4. **cordata**
FF. *Cymes 8–40-fld.: fls. with staminodes* . . . . . 5. **japonica**
DD. *Margin of lvs. coarsely serrate, lvs. often 3-lobed: fls. with staminodes* . . . . . 6. **mongolica**
CC. *Axillary tufts of hairs wanting at the base, present elsewhere: lvs. 4–6-in. long: fls. with staminodes* . . . . . 7. **americana**
AA. *Lvs. with stellate hairs or stellate tomentum beneath: fls. with staminodes.*
D. *Branchlets glabrous.*
C. *Axillary tufts of hairs present on the grayish green or grayish under side of the lvs.* . . . . . 8. **neglecta**
CC. *Axillary tufts of hairs wanting, under side white or whitish.*
D. *Under side of lvs. densely white-tomentose.*
E. *Size of the ovate or ovate-oblong lvs. 4–7 in., margin sharply serrate* . . . . . 9. **heterophylla**
EE. *Size of the orbicular-ovate lvs. 2–4 in., margins sinuately serrate* . . . . . 10. **Oliveri**
DD. *Under side of lvs. thinly grayish tomentose or stellate-pubescent, usually with long hairs on the veins* . . . . . 11. **spectabilis**
BB. *Branchlets pubescent.*
C. *Without axillary tufts of hairs on the lvs. beneath.*
D. *Shape of lvs. orbicular-ovate, the white tomentum persisting.*
E. *Tomentum of branchlets, buds, and petioles grayish or whitish; margin of lvs. finely serrate with short-pointed teeth.*
F. *Habit upright: petioles shorter than half the blade: fr. slightly 5-angled* . . . . . 12. **tomentosa**
FF. *Habit pendulous: petioles longer than half the blade: fr. 5-furrowed* . . . . . 13. **petiolaris**
EE. *Tomentum of branchlets, buds, and petioles yellowish or brownish: margin of lvs. coarsely serrate with long-pointed teeth* . . . . . 14. **mandschurica**
DD. *Shape of lvs. ovate or triangular-ovate; lvs. irregularly and coarsely serrate with short-pointed teeth, often glabrescent with age* . . . . . 15. **Miqueliana**
CC. *With axillary tufts of hairs; lvs. orbicular-ovate, grayish-tomentose beneath, brownish on midribs and nerves* . . . . . 16. **Maximowiczziana**

1. **platyphyllos,** Scop. (*T. grandifòlia*, Ehrh. *T. europæa*, Linn., in part). LARGE-LEAVED LIME. Fig. 3811. Tree, to 120 ft.: young branchlets pubescent, older glabrous: lvs. orbicular-ovate, abruptly acuminate, obliquely cordate at the base, regularly serrate, dull green and short-pubescent or glabrous above, light green and pubescent beneath, 3–4 in. long; petioles stout, hairy: fls. in usually 3-fld. pendulous cymes; petals oblanceolate, longer than sepals; stamens 30; style glabrous: fr. globose, ovoid or pyriform, 3–5-ribbed, apiculate, tomentose, thick-shelled. June; the earliest species to bloom. Eu. G.F. 2:256 (adapted in Fig. 3811). H.W. 3:42, p. 24, 25. R.F.G. 6:316, 317, 318.—Very variable; some of the most important varie-

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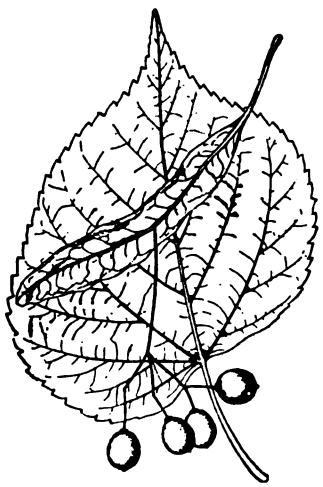
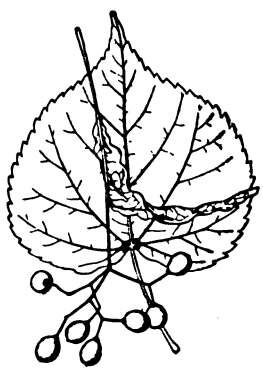
ties are the following: Var. **pyramidàlis,** Kirchn. Of narrow pyramidal habit. M.D.G. 1898:161. Var. **corállina,** Dipp. (var. *rùbra,* Hort.). Young branches red. Var. **aùrea,** Kirchn. Young branches golden yellow. Var. **laciniàta,** Henry (var. *asplenifòlia,* Kirchn. var. *filicifòlia,* Hort. *T. europæa* var. *laciniàta,* Loud.). Lvs. deeply and irregularly cut. G.W. 15, p. 662. Var. **vitifòlia,** Simonkai. Lvs. slightly 3-lobed or indistinctly lobed.—This species is the strongest grower and in this country often sold as *T. europæa.* It is more impatient of drought than most other species and therefore not to be recommended as a street tree.



3812. Tilia vulgaris. (×½)

2. **vulgàris,** Hayne (*T. intermèdia,* DC. *T. europæa,* Linn., in part). Common Linden. Fig. 3812. Tree, to 120 ft.: young branchlets glabrous: lvs. broadly ovate, abruptly acuminate, obliquely cordate or truncate at the base, serrate with short-pointed teeth, dark green above, light green beneath, glabrous except axillary tufts of hairs, 3–4 in. long; petiole about half as long as the blade: fls. 5–10, similar to those of the preceding species: fr. ovoid or globose, apiculate, tomentose, thick-shelled. June, July; a week or 10 days later than the preceding species. G.F. 2:256 (adapted in Fig. 3812). R.F.G. 6:313. M.D.G. 1904:188, 189.—Supposed to be a spontaneous hybrid of the preceding species and *T. cordata.* This is one of the best species for general planting and fine old trees of it are occasionally seen in this country.

3. **euchlòra,** Koch (*T. dasýstyla,* Kirchn., not Stev. *T. rùbra* var. *euchlòra,* Dipp.). Crimean Linden. Tree, to 50 ft.: young branchlets glabrous, green: lvs. orbicular-ovate, abruptly acuminate, obliquely cordate at the base, regularly serrate, the teeth with slender points, dark glossy green above, paler beneath and glabrous except axillary tufts of brown hairs, 2–3 in. long; petiole slender, more than half as long as the blade: fls. 3–7, in pendulous cymes; style pubescent near the base: fr. ovoid, slightly 5-ribbed, tomentose, thick-shelled. July. M.D.G. 1901:381, 540.—Supposed to be a hybrid of *T. caucasica,* Rupr., and *T. cordata* and seems to occur spontaneously in the Caucasus and Transcaucasia. It is one of the most beautiful lindens on account of its dark green glossy foliage. It is usually prop. by budding.



3813. Tilia cordata. (×½)

4. **cordàta,** Mill. (*T. ulmifòlia,* Scop. *T. parvifòlia,* Ehrh. *T. microphýlla,* Vent. *T. silvéstris,* Desf. *T. europæa,* Linn., in part). Small-leaved Linden. Fig. 3813. Tree, to 100 ft.: young branchlets at first slightly pubescent, soon glabrous: lvs. suborbicular, often broader than long, cuspidate, cordate at the base, regularly serrate with short-pointed teeth, dark green and somewhat lustrous above, glaucous and glabrous beneath with brown axillary tufts, 1½–2½ in. long; petioles about half as long as blade: fls. 5–7 in nearly upright cymes; style glabrous: fr. globose, slightly ribbed, apiculate, tomentose, with thin fragile shell. July. Eu. G.F. 2:257 (adapted in Fig. 3813). H.W. 3:41, pp. 21, 22. R.F.G. 6:311, 312. M.D.G. 1904: 188. Var. **pyramidàlis,** Wittm. Of narrow pyramidal habit.

5. **japónica,** Simonkai (*T. cordàta* var. *japónica,* Miq.). Tree, to 60 ft.: young branchlets slightly pubescent at first: lvs. suborbicular, almost like those of the preceding species, 2–3 in. long; petioles usually longer than half the blade: fls. 7–40, in pendulous cymes; staminodes present: fr. ovoid, not ribbed, tomentose, thin-shelled. July. Japan. S.I.F. 1:72.

6. **mongòlica,** Maxim. Small tree, to 30 ft.: young branchlets glabrous, reddish: lvs. suborbicular, or ovate, acuminate, subcordate or truncate at the base, coarsely serrate and usually 3-lobed, dark green and shining above, glaucescent beneath, glabrous except axillary tufts, 1½–2½ in. long: fls. 6–12 in a cyme; the bract stalked; staminodes present; style glabrous: fr. ovoid, mucronulate, tomentose, thick-walled. July. Mongolia, N. China. R.H. 1902, p. 476. S.T.S. 1:61.

3814. Basswood, or American linden.—Tilia americana. (×½)

—Very distinct with its small coarsely serrate, birch-like lvs. reddish when unfolding; it flowers when only a few feet high.

7. **americàna,** Linn. (*T. glàbra,* Vent.). Fig. 3814. Tree, to 120 ft.: young branchlets glabrous, green: lvs. broadly ovate, abruptly acuminate, cordate or truncate at the base, coarsely serrate, the teeth long-pointed, dark green above, light green beneath with tufts of hairs in the axils of the lateral veins, but wanting at the base, 4–6 in. long, turning yellow in autumn: cymes pendulous, many-fld.: bract stalked, tapering toward the base: staminodes present: fr. ovoid or globose, without ribs, tomentose, thick-shelled. July. Canada, south to Va. and Ala., west to N. Dak., Kans., and E. Texas. S.S. 1:24. Mn. 6:153. Var. **macrophýlla,** Hort. (var. *mississippiénsis,* Hort.). A large-lvd. form. —This species is frequently planted as an avenue tree. Its wood is much used in the manufacture of wooden-

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ware, cheap furniture, panels of carriages, and also of paper pulp.

8. **neglécta,** Spach (*T. Michaùxii*, Sarg., not Nutt. *T. pubéscens*, Hort., not Vent.). Tree, to 80 ft.: branchlets glabrous, red: lvs. broadly ovate or ovate, acuminate, obliquely cordate at the base, rarely truncate, coarsely serrate, with long-pointed, usually incurved teeth, dark green and glabrous or sparingly pubescent above, more or less stellate-pubescent and grayish green beneath with conspicuous axillary tufts, 5–6 in. long, turning yellow in autumn: cymes many-fld.; bract decurrent nearly to the base, tomentulose above; peduncle glabrous: fr. subglobose or ovoid, slightly furrowed, tomentose. July. E. Canada to Ga. and Texas west to Ohio. S.M. 673.—This species has often been confused with *T. pubescens* and with *T. heterophylla*.

9. **heterophýlla,** Vent. (*T. álba*, Michx. *T. Michaùxii*, Nutt.). Tree, to 60 ft.: young branchlets glabrous and red: lvs. broadly ovate to oval-ovate, short-acuminate, obliquely truncate or cordate at the base, finely serrate with rather short-pointed teeth, dark green and glabrous above, white-tomentose beneath without axillary tufts, 4–7 in. long: fls. in many-fld. pendulous cymes; bract decurrent often nearly to the base, rather large: fr. subglobose, tomentulose. June. W. N. Y. to Ala. and Ill. S.S. 1:27.—This is a very handsome linden with its large lvs. silvery white below and is sometimes sold as *T. macrophylla*.

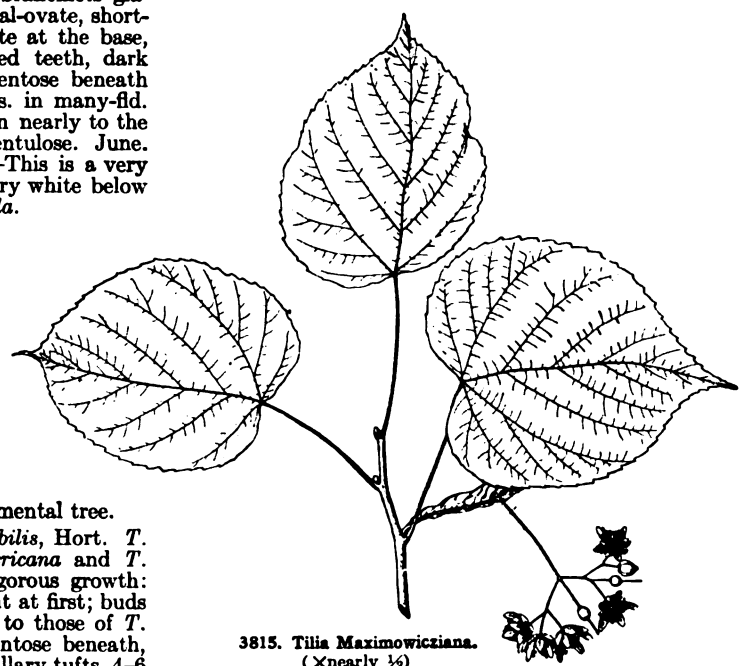
10. **Óliveri,** Szyszylowicz. Tree, to 50 ft.: young branchlets reddish brown, glabrous: lvs. ovate, short-acuminate, cordate or truncate at the base, sinuately denticulate, with short gland-tipped teeth, dark green and glabrous above, white-tomentose beneath, without axillary tufts, 3–5 in. long; petioles glabrous: fls. about 20, in pendulous cymes; bract sessile; pedicels short, thickened: fr. globose, tomentose and tuberculate, apiculate, thick-shelled. Cent. China.—This recently intro. species promises to be a handsome ornamental tree.

11. **spectábilis,** Dipp. (*T. álba spectábilis*, Hort. *T. Blechiàna*, Hort.). Hybrid of *T. americana* and *T. petiolaris* or *T. tomentosa*. Tree of vigorous growth: branchlets glabrous or slightly pubescent at first; buds pubescent toward the top: lvs. similar to those of *T. americana*, ovate, slightly grayish tomentose beneath, with long hairs on the veins, without axillary tufts, 4–6 in. long, 3–5 in. wide: infl. and size of fls. like those of *T. americana*, but tomentose though less densely than *T. tomentosa*. Blooms 2 or 3 weeks earlier than *T. tomentosa*. Of unknown origin; a similar form was raised from seed of *T. petiolaris* at the Arnold Arboretum in 1900. Var. **Móltkei,** Rehd. (*T. Móltkei*, Spaeth). Branchlets and buds quite glabrous: lvs. often without long hairs on the veins, 6–7 in. long. Originated at Spaeth's nursery near Berlin, Germany.

12. **tomentòsa,** Moench (*T. argéntea*, DC. *T. álba*, Ait. *T. álba pyramidàlis*, Hort.). WHITE LINDEN. Tree, to 100 ft. with upright branches: young branchlets stellate-tomentose: lvs. nearly orbicular, abruptly acuminate, truncate or cordate at the base, serrate or doubly serrate, often lobulate, with short-pointed teeth, sparingly pubescent above, white-tomentose beneath, 3–5 in. across; petiole pubescent, less than half of the length of the blade: fls. 7–10, in pendulous tomentose cymes: fr. ovoid, slightly 5-angled, tomentose; shell woody. July. E. Eu., Asia Minor. R.F.G. 6:324. H.W. 3:43, p. 26. F.E. 14:1154, pl. 39. G.W. 8, p. 617. M.D.G. 1903:190; 1904:189.—This is a very handsome tree of dense habit with upright branches; it stands heat and drought better than any of the other species. Its fls. and those of the following species have proved poisonous to bees.

13. **petiolàris,** Hook. f., not DC. (*T. tomentòsa* var. *petiolàris*, Kirchn. *T. álba*, Koch. *T. americàna péndula*, Hort.). WEEPING WHITE LINDEN. Tree, to 80 ft., with slender pendulous branches: young branchlets tomentose: lvs. similar to those of the preceding species, but more finely and regularly serrate and petioles slenderer, longer than half the blade: fls. also like those of *T. tomentosa:* fr. globose, depressed at the apex, with 5 furrows, tomentose; seeds often imperfect. G.L. 19:257. Gng. 5:210; 15:291. Gn.W. 22:35 (suppl. Jan. 14). G. 34:687. M.D.G. 1901:163. B.M. 6737.—Known only in cult. and probably a variety of the preceding species.

14. **mandshùrica,** Rupr. & Maxim. Tree, to about 60 ft.: young branchlets and buds with brownish tomentum: lvs. orbicular-ovate, short-acuminate, usually cordate at the base, coarsely serrate with long-pointed teeth, sparingly pubescent above, white-tomentose beneath, 4–6 in. long; petiole about half as long as the blade, tomentose: fls. 7–10, in pendulous cymes covered with brownish tomentum: fr. globose, tomentose, with 5 distinct ribs toward the base or without ribs. N. China, Manchuria, Korea.—Similar to *T. tomentosa*, from which it differs in the larger lvs. with long-pointed teeth and in the fr. Like the two following species still rare in cult.



3815. Tilia Maximowicziana. (×nearly ½)

15. **Miqueliàna,** Maxim. Tree, to 40 ft.: young branchlets finely tomentose: lvs. ovate or deltoid-ovate, usually much longer than broad, acute or acuminate, obliquely cordate at the base, coarsely serrate with broad mucronate teeth, dark green and glabrous or nearly so above, grayish tomentose beneath, without axillary tufts of hairs, 2½–5 in. long: fls. 10–20 in pendulous tomentose cymes; stamens 60–75; style shorter than petals, hairy at the base: fr. subglobose, tomentose, 5-ribbed at the base. Cult. in Japan; native habitat unknown. S.I.F. 1:72.

16. **Maximowicziàna,** Shirasawa (*T. Miyàbei*, Jack. *T. Miqueliàna*, Sarg., not Maxim.). Fig. 3815. Tree, to 100 ft.: young branchlets tomentose: lvs. broadly ovate or orbicular-ovate, abruptly acuminate, obliquely cordate at the base, coarsely serrate with broad mucro-

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nate teeth, dark green above and pubescent at first, finally glabrous or nearly so, grayish tomentose beneath with brownish axillary tufts of hairs, finally often becoming partly glabrous, 3–6 in. long; petiole stout, less than half the length of the blade: fls. small, 10–18 in pendulous tomentose cymes; style exserted: fr. globose, 5-ribbed, tomentose, thick-walled. Japan. S.I.F. 2:50. G.F. 6:113 (adapted in Fig. 3815).

T. caucásica, Rupr.=T. rubra.—*T. corinthiaca*, Bosc=T. rubra, DC.—*T. Henryàna*, Szyssyl. Tree, to 50 ft.: branchlets pubescent at first: lvs. broadly ovate, obliquely cordate or truncate, with bristly teeth, brownish tomentose beneath, with axillary tufts of hairs, 2–5 in. long: fls. 20 or more in a cyme. Cent. China.—*T. intónsa*, Wilson (T. tonsura, Veitch). Tree, to 60 ft.: young branchlets pubescent: lvs. broadly ovate, cuspidate, serrate, pubescent and grayish green beneath, 3–6 in. long: fls. 1–3: fr. ovoid, 5-angled. W. China.—*T. kiusiàna*, Makino & Shiras. Tree, to 50 ft.: lvs. oblong-ovate, acute, obliquely truncate at base, serrate, glabrous, 1½–2 in. long; petiole about ½in. long: cyme 20–35-fld.: fr. globose. Japan. S.I.F. 2:50. Very distinct on account of the small and narrow, short-stalked lvs.—*T. orbiculàris*, Jouin. Very similar to T. petiolaris, but lustrous and glabrous above, grayish tomentose beneath, on shorter petioles. Supposed to be a hybrid between T. petiolaris and T. euchlora, but probably only a variety of the former; originated in the nursery of Simon-Louis near Metz, Germany.—*T. paucicostàta*, Maxim. Small tree; allied to T. cordata: lvs. ovate, usually truncate at base, with long-pointed teeth, green on both sides, about 2½ in. long. W. China.—*T. pubéscens*, Ait. Tree, to 40 ft.: branchlets rusty stellate-pubescent: lvs. ovate, obliquely truncate at the base, coarsely serrate, rusty tomentulose beneath: fr. rusty tomentose. N. C. to Fla. and Texas. S. S. 1:26. Tender and rarely cult.; the plant cult. under this name is usually T. No. 8.—*T. rùbra*, DC. (T. caucasica, Rupr. T. corinthiaca, Bosc). Tall tree with red glabrous branchlets: lvs. similar to those of T. platyphyllos, but glabrous, lustrous above, light green beneath, with long-pointed teeth: cymes 3–7-fld.: fr. ovoid or subglobose, slightly angled. S. E. Eu., Caucasus, W. Asia. Apparently not in cult., often confused with red-branched, slightly pubescent forms of T. platyphyllos.—*T. Spaèthii* =T. americana × T. cordata.—*T. tonsùra*, Veitch=T. intonsa.—*T. Tùan*, Szyssyl. Tree, to 50 ft.: young branchlets glabrous or nearly so: lvs. broadly ovate, truncate or slightly cordate at the base, minutely toothed, entire below the middle, grayish tomentose beneath with axillary tufts, 2½–5½ in. long: cymes 10–20-fld.: fr. subglobose, thick-shelled. Cent. China.

ALFRED REHDER.

TILLÆA (named for M. A. Tilli, 1653–1740). *Crassulàceæ*. Annual herbs, usually very small, aquatic or terrestrial, somewhat succulent, generally very glabrous: lvs. opposite, cylindrical, subulate or flat, very entire: fls. minute, axillary, solitary or cymose or arranged in terminal cymose panicles, white or reddish; calyx 3–5-lobed or parted; petals 3–5, free or connate at the very base; stamens 3–5; carpels 3–5, free: follicles many, rarely 1-seeded. About 25 species, cosmopolitan. *T. muscòsa*, Linn. Minute: sts. branched and decumbent at base, reddish, about 1 in. or more long: lvs. oblong, blunt: fls. axillary, sessile; sepals ovate or lanceolate; petals nearly subulate, white tipped with red. Eu., in moist barren places.

TILLAGE. The working or stirring of the land, with the purpose to improve it for agricultural purposes, is known by the general name of tillage. There is a tendency to use the word cultivation for these operations. Tillage is a specific technical term, and is to be preferred.

In the eager discussions of scientific matters, as applied to agriculture in recent years, there is danger of forgetting that the fundamental practice in all kinds of farming, after all, is the tillage of the land. The knowledge of the importance of tillage has developed late in the world's history. In fact, it was only within the latter part of the last century that the real reasons for tilling came to be popularly understood in this country. Even now there are many persons who think that the object of tillage is to kill weeds.

The modern conceptions of tillage probably date largely from Jethro Tull's book on "Horse-Hoeing Husbandry," which reached the second and full edition in 1733, in England. This book awakened so much discussion that the system of "horse-hoe husbandry" recommended by it was called the "new husbandry." There had been tillage of land before Tull's time, but his writing seems to have been the first technical effort to show that tillage is necessary to make the soil productive rather than to kill weeds or to open the ground to receive the seeds. He contrived various tools whereby grain crops could be sown in rows and afterward tilled. The tillage of the land in early times was confined very largely to that which preceded the planting of the crop. In the vineyards of southern Europe, however, Tull observed that tillage was employed between the vines during the season of growth. Such vineyards prospered. He made experiments and observations on his return to England and came to the conclusion that tillage is of itself a very important means of making plants thrifty and productive wholly aside from its office of killing weeds. He supposed that tillage benefits plants by making the soil so fine that the minute particles can then be taken in by the roots. On the same hypothesis he explained the good effects of burning or "devonshiring" land, and also the benefits that followed the application of ashes: the minute particles of the ashes are so small as to be absorbed by roots. Although this explanation of the benefits of tillage was erroneous, nevertheless Tull showed that tillage is necessary to the best agriculture and that it is not merely a means by which seeds can be put into the land, weeds killed, and the crop taken out.

Tillage improves land in many ways. It divides and pulverizes the soil, gives the roots a wider "pasturage," as Tull puts it, increases the depth of the soil, aërates it, and improves its physical condition with respect to warmth and dryness.

Tillage also saves moisture by deepening the arable soil so that moisture is held, and also by checking evaporation from the surface by means of a thin blanket or mulch of granulated earth that is made by surface-working tools. Water is lost from the soil by underdrainage and by evaporation from the surface. The more finely the soil is granulated, within certain limits, the more water it will hold. Its capillary power is increased. As the water evaporates from the surface, the moisture is drawn up from the under surface so that there is a more or less constant flow into the atmosphere. If any foreign body, as a board or a blanket, is spread on the land, the evaporation is checked. A similar result may follow when the soil is covered with a layer of dry ashes or sand or sawdust. Very similar results are also secured when the surface is made fine and loose by means of frequent shallow tillage. The capillary connection between the surface soil and the under soil is thereby broken, This surface soil itself may be very dry, but it may serve as a blanket or mulch to the soil beneath. In some cases this conservation of moisture by frequent shallow tillage is probably the chief advantage of the tillage of the land in the growing season.

Land that is well tilled has different chemical relations from that which is neglected. Nitrification, decomposition, and other bacterial activities are hastened. The stores of plant-food are rendered available. The soil is made more productive.

The first requisite for the growing of the plant is to have the soil in such condition that the plant can thrive in it. It is only when the land is well tilled and prepared, or when its physical condition is nearly or quite perfect, that the addition of concentrated fertilizers may be expected to produce the best results. Fertilizing, therefore, is a secondary matter; tillage is primary.

The ideal tillage is that which is practised by the gardener when he grows plants in pots. The soil is ordinarily sifted or riddled so that unnecessary parts are removed, and most of it is brought into such condition that the plants can utilize it. The gardener adds leaf-mold or sand or other material, until the soil is brought into the proper physical condition. He also provides drainage in the bottom of his pots or boxes. Often the gardener will produce as much from a handful of soil as a farmer will produce from a bushel.

L. H. B.

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TILLÁNDSIA (Elias Tillands was professor of medicine at the University of Abo, Sweden; in 1673 he made a catalogue of plants of the vicinity of Abo). *Bromeliàceæ*. Mostly epiphytes and all natives of America, allied to billbergias, æchmeas, guzmanias, pineapples, and the like; ornamental glasshouse subjects.

Perennial herbs, mostly of upright growth (the common *T. usneoides* being a marked exception), the bases of the narrow entire lvs. often dilated and forming cups that hold water and in which utricularias and other water-plants sometimes grow: fls. usually borne in spikes or heads, singly beneath bracts, perfect, with 3 sepals and 3 petals which are twisted or rolled in the bud, 6 stamens, a superior ovary with filiform style: fr. a 3-valved caps. containing hairy or plumose seeds. Vriesia is distinguished by having 1 or 2 scales or ligules at the base of the petals on the inside, whereas the petals of Tillandsia are eligulate. By some authors the Spanish moss is placed separately, as *Dendropogon usneoides*, Raf., distinguished by the habit and also by characters of flower and seed. Some of the cult. tillandsias belong to still other genera. This is the case with *T. zebrina*, which is properly *Cryptanthus zonatus* (Fig. 1120, Vol. II). This is an odd plant, producing crinkled deflexed saw-edged lvs., which are whitish beneath and brown-barred above, and small clusters of white fls. See p. 902, where other kinds of Cryptanthus in the American trade are described. Many species are described in horticultural literature as having been intro. into cult. but most of these are known only to amateurs and in collections where species of botanical interest are chiefly grown. In the American trade about 30 names appear, many of which are to be referred to other genera. The generic limits of Tillandsia, as of most bromeliaceous genera, are ill defined. By different authors a given species may be placed in any one of a half-dozen genera. Lately, Tillandsia and Vriesia have been merged, but in this book Vriesia is kept distinct, following Mez's monograph. It is useless to attempt a description of all the tillandsias that by chance may occur in collections. Persons who want to know the species other than those regularly in the trade should consult Baker's Handbook of the Bromeliaceæ, 1889, or Mez's Bromeliaceæ in DeCandolle's Monographiæ Phanerogamarum, 1896. The latter work, which regards Vriesia as a separate genus, admits 248 species of Tillandsia. The genus extends northward into the U. S., growing chiefly in Fla., and Texas, although one or two reach S. Ga., and the Spanish moss (which is *Tillandsia usneoides*) reaches Va. and is common throughout the South. The native upright tillandsias are not in the general trade, but they are sometimes offered: of such are *T. recurvata*, *T. tenuifolia*, *T. fasciculata*, *T. utriculata*.

3816. The Spanish moss (Tillandsia usneoides) hanging from the trees. Gulf coast.

Tillandsias are grown both for foliage and for flowers. The foliage is usually scurfy and sometimes blotched. Many of the species are very showy when in bloom, sending up strong central clusters of blue, violet, red, yellow, or white flowers. In nature, the seeds are carried in the wind by means of the soft hairs, and find lodgment on trees, where the plants grow. A few species, however, grow on the ground. In cultivation, most of the species are treated as pot-plants. The growing season is summer. In winter the plants should be kept nearly dormant, although not completely dry. They need a warm temperature and plenty of light while growing. Give a soil rich in peat. In some cases sphagnum may be added to advantage. Propagation is by suckers; also by seeds. For further cultural notes, consult *Billbergia*.

A. *Plant-body slender and hanging: fls. solitary in lf.-axils.*

usneoides, Linn. SPANISH, FLORIDA, or LONG MOSS. Figs. 3816, 3817. Whole plant hoary-gray, hanging from trees, the sts. very slender and often several feet long: lvs. scattered, narrow-linear, 1–3 in. long: fls. solitary in the lf.-axils, small and not showy, the petals yellow and reflexed at the end. Trop. Amer. and in the U. S. from Texas to Fla. and E. Va.; extends southward to S. Brazil. B.M. 6309. Gn. 37, p. 221. Gt. 45, p. 267. —This is one of the most characteristic plants of our southern regions. In moist regions it gives a most weird aspect to the forests. It is used as a packing material, and also, when specially prepared, for upholstery. It is rarely cult., although it is not uncommon in greenhouses, being hung on branches and beams; but it must be renewed frequently. The plant is named for its resemblance to the lichen Usnea.

AA. *Plant-body stiff and nearly or quite erect.*

B. *Stamens shorter than the petals.*

C. *Fls. few in the cluster.*

recurvàta, Linn. (*T. Bártramii*, Ell., at least in part). A few inches high, tufted, with scurfy terete or filiform recurved 2-ranked lvs.: fls. 1–5 on spike that is sheathed at the base but naked above, the corolla blue and exceeding the calyx. Fla. to Argentina and Chile.

CC. *Fls. many, distichous.*

ánceps, Lodd. (*Vrièsia ánceps*, Lem.). Erect, the fl.-st. 6–12 in. tall and bearing a spike with large distichous green bracts from which small blue fls. emerge: lvs. stiff, about 1 ft. long, dilated and striped at the base: fls. 2 in. or less long, blue or purplish, the perianth much exceeding the calyx. Costa Rica, Trinidad. L.B.C. 8:771.

Lindeniàna, Regel (*T. Líndenii*, Morr. *Vrièsia Líndenii*, Lem.). Lvs. rosulate, about 1 ft. long, dilated at the base, long recurving: spike large, the showy distichous bracts carmine: fls. large, much exserted beyond the bracts, the large wide-spreading segms. bluish purple. Ecuador, Peru. I.H. 16:610; 27:370 (as var. *Regeliana*). G.C. II. 12:461. R.H. 1872:230; 1898: 206 (as var. *tricolor*) F.M. 1872:44.—A handsome and popular species. This interesting species has also been described as *Phytarrhiza Lindenii*, Morr.

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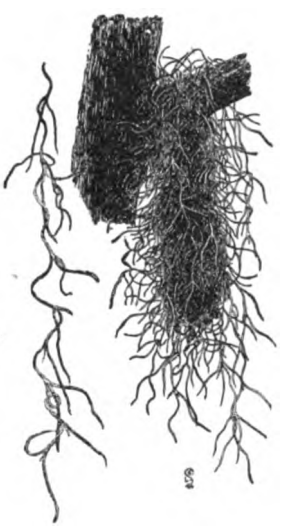
BB. *Stamens longer than the petals.*

C. *St. thickened and bulb-like at the base.*

bulbòsa, Hook. Small scurfy plant a few inches high, the st. swollen at the base: lvs. 3–5 in. long, much dilated and clasping at the base and terete above: fls. few, in racemose short spikes, long and narrow, the much exserted but not spreading petals purple. Var. **pícta,** Hook., has the upper lvs. and bracts scarlet. W. Indies to Venezuela. B.M. 4288. F.S. 3:221.



3817. Spanish moss.—Tillandsia usneoides. (Much reduced)

CC. *St. not prominently swollen.*

D. *Lvs. linear or filiform from the base or abruptly from a dilated base.*

polystàchya, Linn. (*T. angustifòlia,* Swartz. *T. parvispica,* Baker). Lvs. rosulate, lepidote or scurfy, curved, equaling or exceeding the st.: infl. compound, somewhat paniculate, the lateral spikes shorter than the central ones, the bracts distichous and pointed and little exceeding the calyx: fls. blue. S. Fla. to Brazil.

tenuifòlia, Linn. (*T. cæspitòsa,* Le Conte, not Cham. & Schlecht. *T. Bártramii,* Ell., in part). Plant less than 6 in. tall, reddish, clustered: lvs. awl-shaped and erect, nearly terete, concave at the base, scurfy: fls. few in a simple or somewhat compound spike, the blue petals exceeding the bracts and recurving at the apex. Ga. to Brazil.

DD. *Lvs. gradually narrowed from a broad base.*

fasciculàta, Swartz (*T. bracteàta,* Chapm. *T. glaucophýlla,* Baker. *Vrièsia glaucophýlla,* Hook.). Tall, strong species with st. 2 ft. tall: lvs. 1–1½ ft. long, concave or channeled above, erect or ascending, scurfy and bluish: st. longer than the lvs. and branched, the branches or spikes bearing distichous keeled acute mostly greenish and red-tinged bracts: fls. narrow, exserted, blue. S. Fla., W. Indies, and Cent. Amer. B.M. 4415. F.S. 5:432.—Very variable.

utriculàta, Linn. Plant 2–3 ft. high: lvs. glaucous and scurfy, becoming subulate and recurved at the summit but much dilated and imbricated at the base and forming pockets that hold water: infl. branched, the fls. far apart on the branches: fls pale blue (pale colored forms), narrow, the petals twice longer than the sepals. S. Fla. to S. Amer. B.R. 749 (as *T. flexuosa* var. *pallida*).—For full description of this species, together with plate, see Trelease, 5th Rep. Mo. Bot. Gard. (1894).

T. bivittàta, Lind.=Cryptanthus bivittatus.—*T. Blòkii,* Hort.=Vriesia Blokii.—*T. dianthoides,* Rossi. Scape manifest, bearing a simple infl.: fls. erect; sepals glabrous; petals violet. S. Amer. Gt. 3:138. R.H. 1905:464.—*T. Durátii,* Vis. Infl. bi- or tri-pinnately paniculate: fls. erect; petals blue. S. Amer. Gt. 50, p. 452.—*T. farinòsa,* Hort.=Billbergia pyramidalis.—*T. iondntha,* Planch. Lvs. densely tufted, densely scaly: infl. simple, dense, and short; petals violet. Mex. B.M. 5892.—*T. La Salliàna,* "A new species from S. Amer., with most brilliant fls. It is of free growth and easily cult., thriving best in a moderate temperature and in a light, fibrous soil mixed with sphagnum." (Siebrecht.)—*T. Líndenii*=T. Lindeniana.—*T. musáica*=Guzmania.—*T. muscòsa,* Hort., is probably a Pitcairnia. P. muscosa, Hook., B.M. 4770, is Pitcairnia Beycalema. The name T. muscosa has occurred in the trade, but the plant is unknown to the writer.—*T. polytrichioides,* Mass. Lvs. small, densely clothing an elongated st.: infl. 2–4-fld.: petals pale. S. Amer. R.H. 1912, p. 431.—*T. splèndens*=Vriesia.—*T. Wilsonii,* Wats., has been intro. sparingly to cult., but does not appear to be in the trade. It was discovered in Hernando Co., Fla., in 1887 by W. P. Wilson, of the Univ. of Penna.: "St. simple, very short (about ½in.): lvs. numerous, 1–3 or 4 in. long, gradually narrowed from the clasping base to the long-attenuate apex, channeled above, more or less hoary, with minute appressed, peltate, brown-centered scales: peduncle very slender, recurved, about equaling the lvs., with 2 distinct bracts, probably 1-3-fld.: fls. and caps. not seen." This is Sereno Watson's original description, 1888. See Mn. 2, p. 180, and 6, p. 130, for pictures.—*T. xiphioides,* Ker. Lvs. densely scaly: scape very short or wanting? petals white. Argentina. G.W. 6, p. 291. B.R. 105.—*T. Záhnii,* Hort., is properly Guzmania Zahnii, Mez. Tufted, branching from the base, glabrous throughout: lvs. 1 ft. long, about 1 in. broad, crimson striped and yellow: infl. paniculate, subtended by scarlet bracts: fls. yellow. Costa Rica. B.M. 6059 (as Caraguata Zahnii). In the trade. The following names are accounted for under Vriesia: *carinata, fenestralis, guttata, hieroglyphica, peittacina, Saundersii, tessellata, zebrina* (in part).

L. H. B.

GEORGE V. NASH.†

TIMOTHY: *Phleum pratense.*

TINÁNTIA (named after Tinant, a Belgian botanist). *Commelinàceæ.* Erect herbs, either hardy or grown in the greenhouse: lvs. medium-sized or large: peduncle terminal, rarely with 1–3 extra in the upper axils; cyme terminal, with 1–3 branches floriferous from nearly their base: fls. pedicelled; sepals distinct, green; petals distinct, obovate; stamens 6, all perfect; ovary sessile, 3-celled: caps. 3-celled, loculicidally dehiscent.—About 6 species, Trop. Amer. **T. fúgax,** Scheidw., is a tradescantia-like herb: st. glabrous, 1½ ft. high: lvs. ovate-lanceolate, pilose above, glabrous beneath: peduncle villous, 1–3-branched at apex, branches umbellate: fls. blue, with their pedicels conspicuously bracteolate at base. Known also as *Tradescantia erecta, T. undata, T. latifolia.* B.M. 1340. B.R. 1403. L.B.C. 13:1300.—Sometimes seen in old gardens but not offered in the trade.

TINNÈA (named in honor of Mlle. Tinné). *Labiàtæ.* Tall perennial herbs or subshrubs, pubescent or woolly, adapted to the warmhouse. Lvs. very entire: floral whorls usually laxly 2-fld., axillary or in a terminal raceme: fls. fuscous- or violet-purple, fragrant; calyx ovoid, 2-lipped; corolla-limb somewhat 2-lipped; stamens 4, didynamous; ovary shortly 4-lobed: nutlets obovoid-clavate.—About 23 species, Afr. **T. Sacleûxii,** Sprenger. Dwarf shrub with the branches shortly and densely pubescent: lvs. short-petioled, oblong or ovate, entire, ¾–1 in. long: cymes axillary, 2–5-fld.: calyx membranous, deeply 2-lipped; corolla nearly 1 in. long, lower lip much longer than upper. Trop. Afr. (?).

TIPUÀNA (name apparently Latinized from a Brazilian name). *Leguminòsæ.* Showy unarmed trees, used ornamentally in the extreme southern U. S. Lvs. unevenly pinnately compound, without stipels; lfts. several, alternate; stipules minute, caducous: fls. showy, yellow or pale purplish, in loosely branched terminal panicles; calyx turbinate, teeth short and broad; standard ovate or suborbicular, not appendaged; wings obliquely obovate or oblong; keel-petals obliquely oblong, obtuse, lightly connate; stamens all connate in a sheath which is split above: pod stipitate, indehiscent, 1–3-seeded, samara-like.—About 4 species, S. Amer. Here belongs the plant recently intro. to S. Calif. as *Machærium Tipu,* which is said to yield one of the rosewoods of S. Brazil.

speciòsa, Benth. (*Machærium Tipu,* Benth.). Tender yellow-fld. tree: lfts. 11–21, oblong, emarginate, entire, 1½ in. long; veins somewhat parallel: standard broadly orbicular; wings very broadly half-ovate, much larger than the keel: pod veiny. S. Amer.

F. TRACY HUBBARD.†

TIPULÀRIA (Latin, *Tipula,* a genus of insects, alluding to the form of the flower). *Orchidàceæ.* Small terrestrial orchids in N. Amer. and the Himalaya region. Herbs with solid bulbs, having several generations connected by offsets: lf. solitary, basal, appearing in autumn long after the flowering season: fls. in a long, loose, terminal raceme, green, nodding; sepals and

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petals similar, spreading; labellum 3-lobed, produced into a long spur behind; column erect, wingless or narrowly winged.—Two species, one Himalayan.

díscolor, Nutt. (*T. unifòlia,* BSP.). CRANE-FLY ORCHIS. Scape 15–20 in. high: lf. ovate, 2–3 in. long, appearing in autumn and often surviving through the winter: raceme 5–10 in. long, loose: fls. green, tinged with purple. July, Aug. Vt. and Mich. to Fla. and La. B.B. 1:480.—Rare. HEINRICH HASSELBRING.

TITHÒNIA (of mythological derivation; Tithonus was the favorite of Aurora). *Compósitæ.* Robust half-hardy annuals sometimes shrubby at base: lvs. alternate, petioled, entire or 3-lobed: heads large, on a long thickened peduncle, heterogamous; ray-fls. neuter, disk-fls. perfect and fertile; involucre hemispherical or broadly campanulate; receptacle convex; corolla yellow, ray-fls. ligulate, disk-fls. tubular, 5-toothed: achenes somewhat pilose.—About 10 species, Mex., Cent. Amer., and W. Indies.

diversifòlia, Gray (*Mirasòlia diversifòlia,* Hemsl.). Large shrub with rather stout branches, glabrous or nearly so: lvs. petioled, membranaceous, glabrous or puberulent, ovate or almost orbicular, entire or 3–5-lobed, 9 x 6 in., crenate: heads orange, up to 6 in. diam., terminal or lateral, usually in 3's, on short thickened peduncles: achenes club-shaped. S. Mex. and Guatemala.

speciòsa, Hook. (*Leìghia speciòsa,* DC. *Heliánthus speciòsus,* Hook.). Shrub with erect, terete st.: lvs. petioled, cordate, 3-lobed or entire, crenate: peduncle with a single head, which is scarlet and about 3 in. diam.: achenes obtusely 4-angled. Mex. B.M. 3295. G.C. III. 57, suppl. Mar. 13. F. TRACY HUBBARD.

TOCÒCA (tococo is the native name of *T. guianensis*). Including *Sphærógyne. Melastomàceæ.* Glabrous or hispid-pilose shrubs, sometimes bearded with setæ at the axils, grown in the warmhouse for their foliage.

Leaves petioled, large, membranaceous, rarely coriaceous, entire or denticulate, 5-nerved: fls. rather large, arranged in terminal and sometimes also lateral panicles, white or rose; calyx glabrous, pilose or hispid, tube campanulate, terete or ribbed, limb obtusely rarely acutely 5–6-lobed; petals 5–6, obovate or oblong; stamens 10–12; ovary 3–5-celled: berry fleshy; seed obovoid or pyramidal.—About 50 species, natives of Brazil, N. Venezuela, and Guiana.

Tococa requires a warmhouse temperature, with shady and fairly moist place. Use leaf-mold mixed with fibrous loam, and provide ample drainage. It is best propagated from what are called split joints, or eyes with the leaf rolled up, and inserted in thumb-pots in fine sand with chopped moss; then insert pot in sand or cocoa fiber, with bottom heat of 75° to 80°. Cover with bell-glass or other inclosure to exclude air and to keep a fairly moist (but not wet) condition. In about two months the cuttings will have rooted. The wood for propagating should be well ripened. (H. A. Siebrecht.)

imperiàlis, Nichols. (*Sphærógyne imperiàlis,* Lind.). St. simple or little branched, erect, robust: lvs. opposite, decussate, oval, with 5 longitudinal ribs running from base to apex and many parallel transverse veins connecting them. Peru. I.H. 24:284.—Native of Peru, and intro. to Eu. by Linden in 1871. It is said to be easily grown in a warmhouse.

platyphýlla, Benth. (*Sphærógyne latifòlia,* Naud.). Short-stemmed plant with succulent somewhat tortuous st: lvs. broadly ovate, minutely denticulate-ciliate, 7-nerved: fls. rosy or red; ovary 5-loculed. Colombia, Venezuela, Costa Rica.—Cogniaux puts this species in a section characterized by having the lvs. destitute of vesicles and the calyx not winged. In this section it is unique by reason of its herbaceous branches with long bristles, especially at the nodes; the other species of the section have shrubby and glabrous branches. A very beautiful plant, but considered to be difficult to grow. WILHELM MILLER.

TODDÀLIA (*Kaka Toddali,* Malabar name of *T. aculeata*). *Rutàceæ.* Shrubs usually somewhat climbing or sarmentose, unarmed or prickly, adapted to the warmhouse and hardy outdoors in the extreme S. Lvs. alternate, 3-foliate; lfts. sessile, lanceolate, leathery, entire or crenate, pellucid-punctate: cymes or panicles axillary and terminal: fls. rather small, unisexual by abortion; calyx short, 2–5-toothed, -lobed, or -parted; petals 2–5, imbricate or valvate; male fls., stamens 2, 4, 5, or 8, ovary rudimentary; female fls., ovary ovoid, oblong or globose, 2–7- rarely 1-celled: fr. pea-like, hard, coriaceous, globose, permanently syncarpous.—About 20 species (including Vepris), natives to the Old-World tropics and the Cape. In Toddalia proper the petals are valvate, and the stamens as many as the petals; in the subgenus Vepris the petals are imbricate and the stamens twice as many as the petals.

lanceolàta, Lam. (*Vèpris lanceolàta,* A. Juss.). Small tree or large shrub, erect, without prickles, entirely glabrous: petioles 1–2 in. long; lfts. oblong-lanceolate, 2–3 in. long, acute, entire, waved at the edge, ¾–1 in. broad: panicles axillary and terminal, thyrsoid: petals a line long, imbricate; stamens 8, in the male fls. exserted: fr. the size of a pea, 4-lobed, fleshy, gland-dotted. Mauritius, Mozambique, Cape.—Intro. by Reasoner Bros., 1891. WILHELM MILLER.

TODÈA (H. J. Tode, a German botanist, 1733–1797). *Osmundàceæ.* GRAPE FERN. A group of ferns with fleshy sporangia, as in Osmunda, but having these borne on the backs of ordinary lvs. The last three species, although frequently united with Todea, more properly form a distinct genus Leptopteris, differing widely in habit from the original Todea; they form delicate foliage plants resembling the filmy ferns in habit. For cult., see *Ferns.*

A. *Texture leathery: lvs. bipinnate.*

bárbara, Moore (*T. africàna,* Willd.). St. short, erect: lvs. in a crown, 3–4 ft. long, 9–12 in. wide; pinnæ erect, spreading, sometimes 2 in. wide: sori closely placed, often covering the whole under surface at maturity. S. Afr. to New Zeal. G. 37:265.—A very resistant and useful fern. It deserves wider cult.

AA. *Texture thin: lvs. with linear divisions.*

B. *Lvs. tripinnatifid.*

hymenophylloìdes, Rich. & Less. (*T. pellùcida,* Hook.). Lvs. 1–2 ft. long, 8–12 in. wide, lowest pinnæ about as long as the others; rachises mostly naked. New Zeal.

supérba, Col. St. erect, woody: lvs. 2–4 ft. long, pinnæ often crisped, the lower gradually reduced; rachises densely tomentose. New Zeal.

BB. *Lvs. bipinnate.*

Fràseri, Hook. & Grev. St. erect, woody, 18–24 in. high: lvs. 1–2 ft. long, lowest pinnæ nearly as large as the others; rachis narrowly winged, naked. Austral. L. M. UNDERWOOD.

TOFIÈLDIA (named after Tofield, a Yorkshire botanist). *Liliàceæ.* Perennial herbs, mostly hardy: sts. erect, from a short or repent rhizome: lvs. radical or clustered at the base of the st., short-linear, somewhat distichous; cauline lvs. few or none: fls. small, in a terminal spike, subsessile or short-pedicelled; perianth persistent, segms. oblong or narrow; stamens 6; ovary sessile: caps. 3-lobed.—About 25 species, mostly north temperate and boreal regions but 1 or 2 in the Andes. *T. racemòsa,* BSP. (*T. pùbens,* Michx. *Triántha racemòsa,* Small). Sts. slender, 1–2 ft. high, minute glandular: lvs. narrow-linear, 6–12 in. long: perianth rigid, whitish, 2 lines long. Pine barrens, N. J. to Fla. and Ala. B.M. 3859. Of no special horticultural value.

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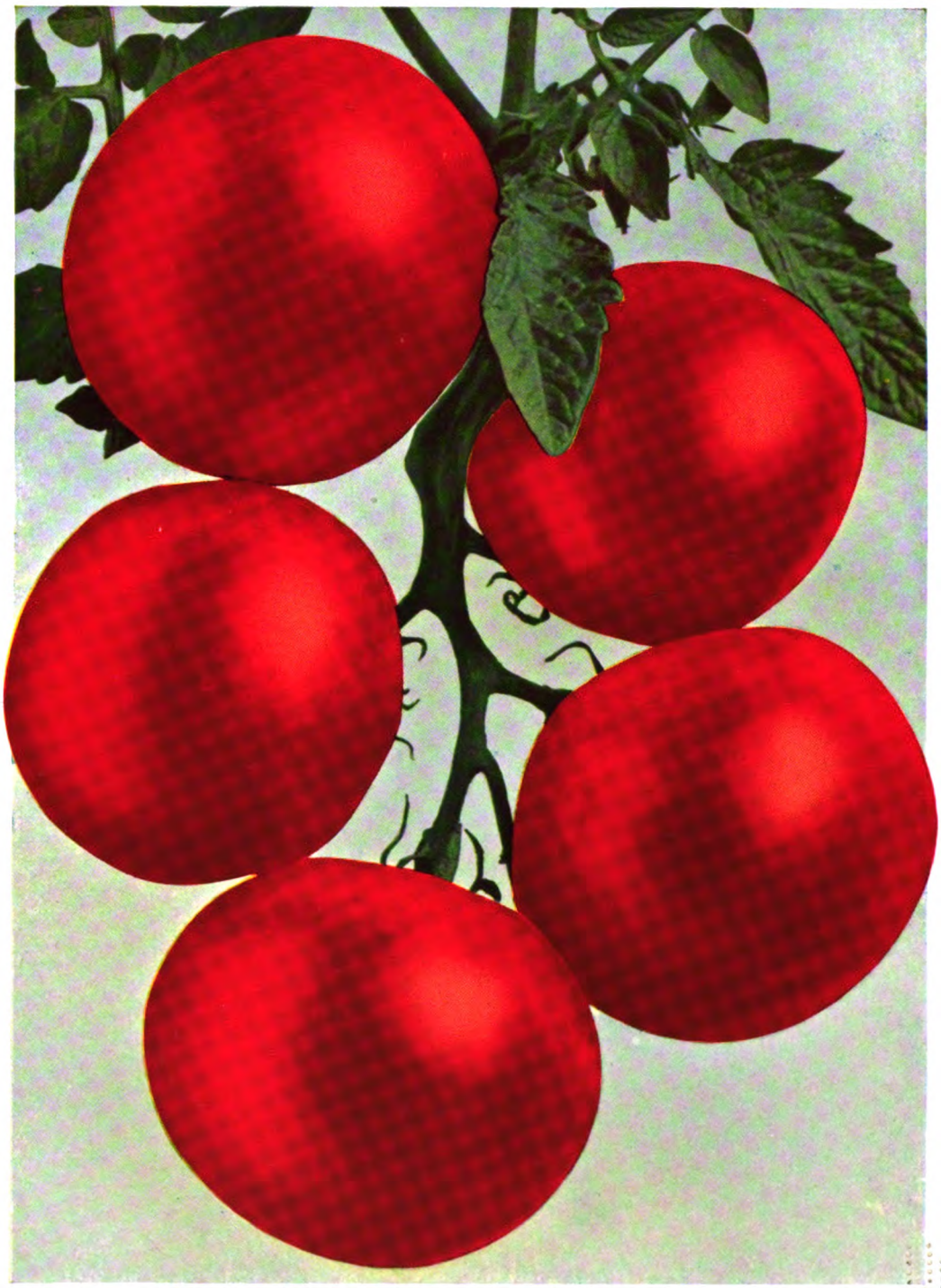

CXII. A good type of commercial tomato.—Brinton Best.

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TOLMIÈA (named for Dr. Tolmie, surgeon of Hudson Bay Co.). *Saxifragàceæ.* Herbaceous, glandular pubescent, hardy: rhizome scaly: sts. simple: cauline lvs. alternate, radical petioled, cordate-incised-lobate; stipules membranaceous: racemes terminal, slender, simple: fls. rather secund, nodding, green; calyx-tube elongate, funnelform-campanulate, 5-lobed; petals 5, capillary; stamens 3; ovary narrowly oblong, 1-celled: caps. exserted from the calyx, superior, 2-valved, 2-beaked.—One species. Borders and wild-garden.

Ménziesii, Torr. & Gray (*Leptáxis Ménziesii,* Raf.). Perennial herb, 1–2 ft. high, with slender creeping rootstocks and some summer runners: lvs. round-cordate, more or less lobed and crenately toothed, slender-stalked, all alternate, those of the st. 2–4 in number: raceme ¾–1½ ft. long: fls. and caps. nearly ½in. long, greenish or tinged purple. Forests of Mendocino Co., Calif., to Puget Sound.—Prop. naturally by adventitious buds, produced at the apex of the petioles of the radical lvs. and rooting when these fall to the ground.

WILHELM MILLER.

TÓLPIS (name unexplained). *Compósitæ.* Herbs, annual and perennial, allied to Crepis, with showy yellow heads, suitable for the flower-garden or border, but apparently not offered in this country; species about 15, in the Medit. region, and the Canaries and Azores. St. rarely somewhat woody: lvs. mostly radical or on lower part of st., entire, dentate or pinnatifid, the upper ones few and narrow: heads homogamous, ligulate, the involucre campanulate with narrow bracts in several series; receptacle naked or pitted: achene subterete, 6–8-ribbed, the pappus of 8–10 very slender setæ. *T. barbàta,* Gaertn. (*Crèpis barbàta,* Linn.), from S. Eu., is an erect branched annual with attractive yellow heads, the outer scales of involucre subulate: lvs. lanceolate, dentate, the upper ones near the fl.-heads long-subulate: blooms from midsummer till frost. B.M. 35.

TOLUÍFERA: *Myroxylon.* The following species now planted as a shade tree in S. Fla. was mentioned under Myroxylon. **M. Pereìræ,** Klotzsch (*Toluífera Pereìræ,* Baill.). Tree: lvs. uneven-pinnate; lfts. 6–9, from 2–3 in. long, 14–16 lines broad, oblong, glabrous; petiole 4½ in. long, terete and sparsely puberulent: pod 2½–3 in. long. Cent. Amer.

TOMATO. The plant *Lycopersicum esculentum* (which see, page 1931, Vol. IV), grown extensively for its edible fruit.

The tomato is probably grown more extensively in North America than elsewhere, and the varieties have reached a high degree of perfection. The American standard or ideal is a tomato that is nearly globular, solid and "smooth" (that is, not wrinkled). (Fig. 3818.) The flat angled and wrinkled tomatoes (Fig. 3819) are now little grown in this country. These forms are little adapted to canning, in which use enormous quantities of tomatoes are employed, and they do not satisfy the popular desire. The old-time pear, cherry, and plum forms (Fig. 3820) are still grown for curiosity and also for the making of pickles and preserves, but their field culture is relatively not important. The currant tomato, grown for ornament and curiosity, is considered to be *Lycopersicum pimpinellifolium.* It sometimes hybridizes with the common species (Figs. 2234, 2235, Vol. IV).

The tomato requires a warm soil and climate, a sunny open position, and also a long season. The plants are usually started in hotbeds or glass houses, being transferred to the open as soon as settled weather comes. They are usually set from 4 to 5 feet apart each way and are allowed to grow as they will, finally covering the ground. For home use, however, the plants are often trained, in order to forward their ripening and to secure larger and better-colored fruits. The best method is to train to a single stem, supported by a stake or perpendicular wire or cord (Fig. 3821); or sometimes it is tied to the horizontal strands of a trellis. This single-stem training requires close attention, and if the time cannot be spared for it, the vines may be allowed to lie on an inclined trellis or rack. This rack training keeps the plants from the ground and thereby allows the individual fruits to develop perfectly and also checks the spread of the fruit-rot; but it usually does not give such perfect fruits as the single-stem training, since the number of fruits is limited in the latter. Sometimes a serious difficulty in tomato-growing is a rot of the fruit. This seems to cause most damage following close wet weather when the fruit is ripening. It is thought to be worst on plants that cover the ground thickly with foliage and do not allow it to become dry on the surface. Usually it does not seriously lessen the crop beyond a few pickings; and if the plants are brought into bearing early and are kept in thrifty condition for subsequent bearing, the percentage of total injury is greatly reduced. The tomato is tender to frost. The green fruit remaining when frost kills the plants may be ripened in tight drawers or cupboards, if it is nearly or quite full grown. The tomato is a short-lived perennial, but in cold climates it is grown from seeds as an annual. It may be grown from cuttings.

L. H. B.

General culture of the tomato.

The tomato plant comes from regions in South America where the conditions of temperature and moisture in its growing season are very constantly favorable for its rapid growth and the ripening of a large yield of fruit. Although it cannot be classed as a tropical and hardly as a semi-tropical plant, it thrives best in a day temperature of 65° to 85° F., makes very slow growth in one below 40° F., and, unless hardened by gradual exposure, will be killed by a short exposure to a temperature of 32°. It is a rapid-growing short-lived plant and under favorable conditions will mature its first fruit in ninety to one hundred and twenty days from the sowing of the seed and continue in bearing for fifty to ninety days, when it will generally die of exhaustion, though its life may be prolonged (but with lessened vigor) either by cuttings or layering. It is emphatically a sun-loving plant and unobstructed sunlight is essential for its most vigorous growth and greatest fruitfulness. An attempt to grow tomatoes of superior or even good quality in an orchard or at a season when the sunlight is likely to be dimmed much of the time by clouds or mists is very likely to be disappointing.

The splendid color often seen in Italian-grown fruits is due to cloudless skies rather than to superior varieties or cultural methods. Under favorable conditions the plant is a vigorous and rapid grower and capable of maturing an enormous crop of fruit, but it requires for even a fair yield very constantly favorable conditions, and any check in its growth from cold or cloudy weather or too deep and harsh cultivation, even if the plant seems fully to recover, will surely materially lessen the yield of fruit. Many cases have been seen in which cultures within a few miles of each other and on similar soil have matured crops differing greatly in quantity and quality as a result of such difference in cultural practice as to bring one crop into the fruiting-stage in better condition, or at a time when the weather was more favorable for a full setting of fruit. The plant, however, is very tenacious of life and will often live and produce some fruit under most unfavorable conditions and many who have grown it for years do not know of the amount of fruit a healthy tomato plant is capable of producing. It is doubtful whether the average yield of all the cultures in the United States exceeds 6,000 pounds of marketable fruit to the acre. Yet every

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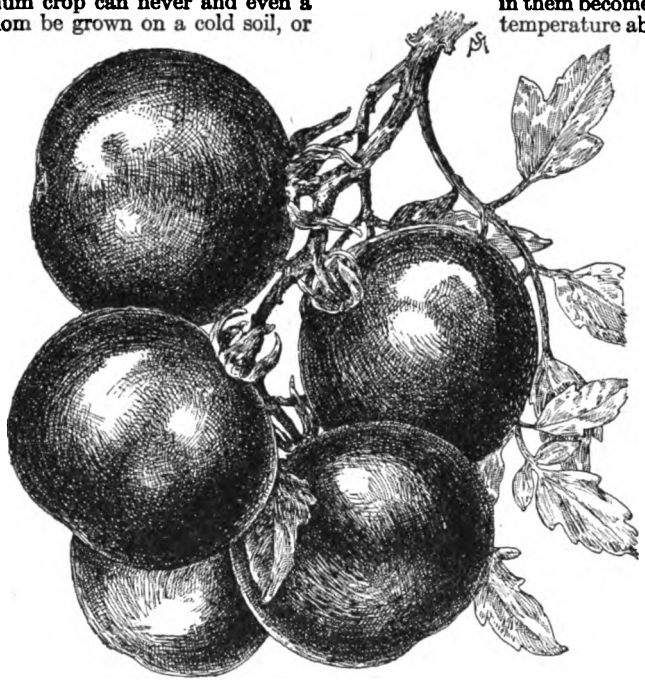
season for the past fifty years many fields have been known where the salable crop was from 30,000 to 40,000 pounds to the acre, with exceptional still larger yields.

Exposure is often an important factor in determining the profit of a crop. Generally a gentle inclination to the southward, with protection of higher land or forest on the side from which cold and damp winds may be expected will give the largest yield of the most marketable fruit, but a sharp inclination to the south, particularly if it be steep or such as to form a hot pocket, rarely produces a maximum crop, although, because of the early ripening of the fruit, it may be a profitable one.

The largest yields recorded were generally grown on red clay loam. Large yields are often secured from soils of very different compositions, from "gumbo" prairie, marsh muck, stiff clay, to a light sand provided the conditions of drainage, fertility, and tilth are favorable, but a maximum crop can never and even a profitable one very seldom be grown on a cold soil, or one which is poorly drained, sodden, sour, or hard and solid from want of cultivation. A good crop of tomatoes very seldom follows one of tomatoes or potatoes.

Tomatoes are rank feeders and the use of fresh stable manures and those carrying a large proportion of nitrogen is likely to result in a rank growth of vines ripening a small crop of fruit of poor quality. The best yields and quality of fruit will usually be from fields rich from fertilizing in previous years. On unfertile fields where one is obliged to use commercial fertilizers, those comparatively rich in potash will generally prove most profitable. The largest yield and best fruit have generally been from rich clover sods, which were plowed as early as practicable in the spring, rolled, and made friable by repeated surface cultivation.



3818. A contemporaneous American tomato.

Although in all but the extreme northern part of the United States, in very high altitudes and in some parts of the Puget Sound country, tomatoes will generally ripen a full crop from seed sown in the open ground, from Washington northward plants so grown will rarely ripen their crop until past midsummer and much of it will miss the long days of sunshine, which are essential for the development of the best quality. On this account it is desirable, in most cases, to start the plants under glass, so as to give them fifty to sixty days' growth by the time they can be set in the open ground without danger from killing frosts. It is very easy to grow plants to this age, but the character of the growth and the condition in which they go into the fields are most important factors in determining the quantity and quality of the fruit.

Starting the plants under glass is usually accomplished best by sowing the seed in boxes about 4 inches deep and of convenient size for handling, filled with soil made up of two-fifths potting earth or garden loam, two-fifths old well-rotted cow-manure, and one-fifth coarse sharp-grained sand. Soils used in plant-boxes or -beds should always be sterilized by spreading over steam-pipes perforated on the lower side and filled with live steam until a potato buried about 3 inches in the soil is cooked soft. The seed can be sown rather thickly and covered ¼ to ⅓ inch deep. The boxes should be well watered and set in the shade until the plantlets show above the soil, when they should be set in full sunlight and kept at a constant temperature between 65° and 80°, and given water as needed. The plants should develop large seed-leaves and bud within ten to fifteen days, when they should be transplanted into the frames. The soil of the frames should be 3 to 6 inches deep and freshly made up and sterilized about as recommended for the plant-boxes. The plants may be set twelve to twenty-four to the square foot, according to the time they are expected to remain before setting in the field. The beds should be closely watched and the sash opened as the air in them becomes warmed by the sun to a temperature above 60° and as promptly closed as it cools below 40°. The soil should be watered as necessary to prevent the plants wilting, but this should be done as far as practicable in evening or early morning, rather than during bright sunshine. If necessary the beds may be protected from frost by covering the sash with sacks, old carpets, straw, or even a sprinkling of earth. An inexperienced person will be surprised to see how effective even a slight covering often is. In case frost does creep in, it is best to keep the beds covered until they can warm up without direct sunshine, even if this takes a day or two. Cases have been known in which plants that seemed to be killed were saved by slow warming up. For a few days before the plants are to be set in field, they should be hardened off by scant watering and fuller exposure both to the sun and night air, and the day before they are to be set should be thoroughly sprayed with bordeaux mixture. The field, particularly if it has been a clover sod, should be prepared and cutworms killed by keeping it absolutely free of green vegetation for at least a week before the plants are to be set and the evening before scattering over the surface poisoned bait made by thoroughly mixing one pound of paris green or similar poison with fifty pounds of bran or middlings moistened with sweetened water. The evening after the plants are set, the poison should also be scattered along the rows and the next day the plants should be again sprayed with bordeaux.

Field culture should begin the day after the plants are set and be repeated every four or five days and as soon after every rain as it can be done without puddling the soil. At first the culture should be as close to the plants and as deep as possible, but it should be farther from the plants and shallower each time until it is a mere stirring of the surface in the center of the row, always taking care to disturb the vines as little as possible. The plants should frequently be looked over

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carefully for potato bugs, the most effective way of combating them being by hand-picking the beetles and eggs when they first appear.

When quantity and quality of fruit is second to early ripening, the seed may be sown earlier and the growth of the plants checked by crowding and a scarcity of water; so treated they generally will form a crown cluster of well-developed fruit by the time one dares risk them in the open. They are then set close in the row and rather deep, with the stem and root slanting to the south and will ripen the first cluster very early, although the remainder of the crop will be late and poor.

3819. The old-time angled form of tomato.

When quality rather than quantity of fruit is of first importance, staking and pruning is sometimes advantageous, particularly if the season or the soil is inclined to be wet. With many growers stakes 2 inches square and 5 to 6 feet long have given the best satisfaction. As soon as the tomato plant forms its first cluster of bloom it divides, and both branches are allowed to grow and then tied to the stakes while all other branches are cut off just beyond the first cluster of blossoms; during the early part of the season this will require daily attention. Staking has been found profitable and is very generally practised in the southern states.

Even when first discovered by Europeans, the plant or plants now commonly called tomatoes existed in many forms differing so materially in habit of plant and character of foliage and fruit that they were classed by botanists as distinct species, and the number of varieties offered has increased with frequent changes until American seedsmen have catalogued tomatoes under at least 513 distinct names, while many other more or less distinct forms are commonly grown abroad, particularly in Italy.

The following are some of the names used in seedsmen's catalogues, many of them standing for distinct forms of vine or fruit, while others are simply variations in stocks.

Currant or Grape.—Rank-growing, but slender small-leaved vine, very productive of long currant-like stems of bright red fruits not over ½ inch in diameter, of little culinary value.

Cherry, both Red and Yellow.—Strong-growing vine, very productive of cherry-shaped fruits, which are excellent for pickles and preserving.

Pear, both Red and Yellow.—Strong-growing vine, small, long-necked, pear-shaped, two-celled fruits.

Plum, both Red and Yellow.—Long oval-shaped, 2-celled fruits, which are excellent for preserving.

Turk's Turban.—Long oval, bright red fruit, with a peculiar growth on the blossom end.

Potato or Broad-leaved (in a number of variations).—Comparatively small vine, with broad entire leaves.

Dwarf Champion.—Vine very short, compact, leaves thick, crumpled, nearly entire.

Tree.—Vine very short, compact and upright in growth, with distinct thick nearly entire leaves.

Peach, both Red and Yellow.—Fruits covered with down similar to that on a peach or plum.

Diadem.—Fruit bright red, distinctly striped with yellow.

White Apple.—Round smooth yellowish white fruit of delicate flavor and the best of all varieties for eating from the hand.

Golden Queen.—Fruit bright yellow, often with a distinct red blush.

Each of the above is so distinct in habit of plant foliage or fruit that botanists might perhaps classify them as distinct species, while the following are some of the more distinct of the varietal forms listed by seedsmen under different names.

Earliana.—Comparatively small weak-growing vine, but maturing very early a large crop of smooth bright red fruit.

Bonny Best.—Vigorous vine, ripening very early and evenly a large crop of uniformly round bright red fruit.

Matchless.—Large smooth bright red fruit, with red fine-flavored but not very solid flesh.

Red Rock.—A healthy productive vine, with uniformly flattened globular fruit of fine flavor.

Dwarf Giant.—Vine dwarf, but very hardy and productive of large handsome bright red fruit of superior quality.

Sterling Castle.—Vine does particularly well under glass, producing large crop of small uniformly round bright red fruit.

Prince Bourghese.—An Italian sort, wonderfully productive of bright red, long plum-shaped fruit of fine flavor.

Stone.—Very vigorous and productive vine, with oval purplish red fruit.

Ponderosa.—Very large solid-fleshed fruit with small seed cavities, little pulp, and few seeds.

June Pink.—Early-maturing, purplish pink fruit.

Acme.—Large vigorous vines, with round purple-pink fruit.

Beauty.—Strong-growing vine, with a large flattish oval purple fruit.

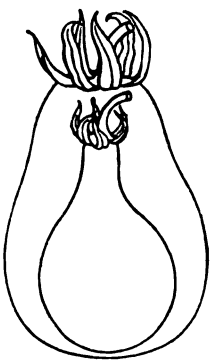
Honor Bright.—Vine, although apparently unhealthy, is very productive of very firm hard-fleshed fruit, which in ripening changes from white to distinct yellow, then to very bright red.

Many carefully conducted trials have shown that first germination crosses will generally give a larger yield of fruit than either parent. In the experience of breeders, such increased yields have been in proportion to the varietal distinctness and purity of stocks crossed.

No distinct difference in the varietal character of plants from seed of different fruits of an isolated vine of pure stock has been noticed, plants from seed of the first and the last ripe fruit of the same vine showing no difference in earliness. Nor has any consistent difference been detected in size or form of fruit in plants grown from seed of a small smooth and a large rough fruit from the same plant.

Although the flowers are seldom self-fertilized, it is thought that they are with few exceptions pollinated from those of the same plant, generally from those of the same cluster and one should be guided in seed selection by the general character of the plant, rather than by that of single fruit. When plants are grown so that the branches intermingle, there would very likely be crossing and it is wisest to save seed from isolated plants.

One should first form a clear-cut conception of the exact varietal character desired, then carefully select isolated plants which come nearest to ideal and save, separately, seed from a number of fruits. A few seeds from each lot should be grown to fruit maturity under glass during the winter. It is quite possible that this will reveal some lots which do not breed true; such can be rejected and the best and purest lots planted for seed crop.



3820. Two forms of the pear tomato.

Seed is often viable when taken from fruit so green that it shows but little color and plants from such seed sometimes show a little gain in earliness, but they are weaker, less fruitful and do not carry their individuality so well as those from fully ripened seed. Plumper, heavier seed, which will retain its viability much longer, is secured from fruit which is fully ripe. The amount to a bushel of fruit varies greatly from only one to two ounces in sorts like the Ponderosa to as high as twelve to fourteen ounces in the smaller more seedy sorts. When the amount of fruit is less than a bushel and the appearance of the seed is important, the best plan is to spread the fruit in the sun until it is fully ripe. Cut each fruit through the center, and by squeezing the pulp and seed can be pressed out. Let this stand, and in one to three days, depending on the ripeness of the fruit and the temperature, it will separate, the seed falling to the bottom. Pour off the liquid, add to the seed two or three times its bulk of water, stir, let settle and pour off the water and repeat with fresh water until seed is clean. Spread not over three or

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four seeds deep and stir every hour or two until seed is thoroughly dry.

Larger quantities can be handled as follows: Separate the pulp and seed from the flesh and skins. Seed-growers usually do this by running the ripe fruit through rollers about ½ inch apart. (In a small way, a hand cider-mill will do this very well.) Then run the pulp and seed through a slowly revolving cylinder of wire netting of about ¼-inch mesh, set at a slight incline so that the seed will fall through the netting, while the flesh, skins, and the like will gradually work out of the lower end. Allow the seed and pulp to stand and ferment until the seed settles and is covered with liquid, which will require from ten to forty-eight hours, according to condition. Care should be taken not to add water or rain while ground fruit is fermenting. Pour off the liquid. Put two or three pails of seed in a barrel, add four to eight pails of water, agitate, and then let seed settle and carefully pour off the water, carrying what pulp and bits of skin it will. Repeat with fresh water till seed is clean. Spread seed not over ¼ inch deep on cloth- or wire-bottom screens. Expose to sun and every few hours stir the seed until it is entirely dry, then bag. Care should be taken to be sure that seed is quite dry before bagging, for it will seem dry to a novice long before it is fit.

W. W. Tracy.

Growing of tomatoes in the South.

The growing of tomatoes on a commercial scale in the southern states began just prior to 1900 and has gradually increased until it is now one of the most important crops grown in that section. Especially is this true of Florida, Mississippi, and Texas.

The crop in Florida begins to move in December and continues at intervals during the winter months. The movement in Mississippi and Texas is more concentrated, beginning the latter part of May and closing the last of June. During the height of the tomato season, solid trainloads of tomatoes are shipped out of the two last-named states daily.

In growing the tomato for the northern markets, earliness is of prime importance. For this purpose, it is necessary to start the crop during the winter months, and, as the tomato is very sensitive to cold, it must be given careful protection for the first six weeks or two months of its growth. This necessarily means extra care and expense, which, in turn, means that the grower, in order to succeed, must exercise a higher degree of intelligence than is shown in the production of the average vegetable crop.

3821. Stake-trained tomato.

It has been clearly demonstrated that it does not pay to grow tomatoes on a large scale, nor does it pay to grow them when most of the help has to be hired. The best results are obtained when a single family plants not over two or three acres and does all the detail work connected with the growing and harvesting of the crop.

Tomatoes for the early market are started in hotbeds. Both manure and flue hotbeds are used for this purpose. The soil of the hotbed should be loose and porous, but not too rich. Especially should an excessive amount of organic matter be avoided. A good average soil, with 1 inch of leaf-mold added gives good results.

The seeds are sown about January 20. They are placed in rows 4 inches apart, ½ inch deep, and from three to four seeds to the inch. Under normal conditions, the seed should begin germinating in six to eight days. The temperature should not be allowed to go over 80° F., during the day, nor below 65° at night. The heat should be so regulated as to produce a slow, steady growth. Too much heat produces rapid, succulent growth, often causing the plants to become weak and spindling, under which conditions they are easily affected by adverse weather and more subject to the attacks of diseases.

3822. A strand of winter tomato, the clusters supported by slings.

As soon as the young plants begin to grow, plenty of ventilation should be given and the soil frequently stirred. The soil should be kept moist, but not wet. By the last week in February, the plants begin to crowd in the row, at which time they should be moved to the coldframe.

The coldframe is usually located in the field where the crop is to be grown. The soil in the coldframe should be richer and should contain more organic matter than that in the hotbed. The rows are laid off about 3 to 4 inches apart, and the plants set 4 inches apart in the row. A board with wooden pegs set 4 inches apart may be used to advantage in opening the holes for the plants. It is advisable to set the plants deeper than they stood in the hotbed, and, as soon as transplanted, they should be given a good watering. Special pains should be taken to protect them from sudden changes in temperature. At first they should be carefully covered at night; and if the weather is very threatening, an extra cover, such as cotton bagging, Sudan grass mats, and the like, should be used. Whenever the weather is clear and bright, the top should be lifted during the warm part of the day. During the latter part of March, when the nights are warm, the cover may be left off entirely, so as gradually to harden the plants. By the first of April, the tomatoes begin to crowd in the row, which is a good indication that they are ready for moving to the open field.

Tomatoes for the early market should be planted on well-drained elevated land, that has some form of windbreak on the north side. The land should be well broken with a turning plow, then disked, harrowed, and laid off in 4-foot rows. A furrow should be run down each row and fertilizer applied and mixed in with the soil. Just before taking the plants from the coldframe, the soil should be given a thorough wetting. Then one end of the coldframe should be knocked out and the soil should be removed to a depth of 2 inches, up to within a few inches of the first row of plants. A sharp spade or mason's trowel is then used and a 4-inch square is cut around each plant, after which the block of soil containing the tomato is carefully lifted and placed in a flat box or on a wide board, which is then

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set in a wagon. The wagon should be made to straddle one row and the plants lifted out from the rear and placed from 2 to 3 feet apart in the three adjoining rows. Special pains should be taken when the plants are placed in the furrow to prevent the soil from breaking away from the roots, as they will wilt easily at this stage. Moist soil should be drawn by hand and pressed around each plant. A sweep or small turning plow should then be run around each row so as to fill in the remainder of the furrow.

Tomatoes should receive frequent and thorough cultivation from the time they are set in the open field until the first fruits begin to ripen. A crust should never be allowed to form on the soil, nor should weeds be allowed to grow. A five-tooth cultivator is one of the best implements that can be used in cultivation.

When moved to the open field, the plants are often beginning to show their first cluster of blooms and are also beginning to force out shoots from the axils of the leaves. The plants should be gone over carefully every few days and all lateral shoots and suckers should be removed before they have grown longer than 1 inch. It is a serious mistake to neglect removing shoots and suckers, even for a few days.

When three or four fruit-clusters have set, the terminal bud is pinched out, and thereafter no new growth whatever should be allowed. This severe pruning undoubtedly reduces the amount of fruit to the acre, but it is a considerable aid in the development of quality and earliness.

The staking, like the pruning, should begin soon after the plants are set in the field. A 4-foot stake, 1 by 2 inches, should be driven down within a few inches of the plant, and coarse twine wrapped around the plant and tied to the stake. Two or three tyings should be made during the development of the plant. The staking holds the vines and fruit off the ground, prevents rotting of the fruit in wet weather, and allows the sun and air to strike the fruit, thus inducing earliness, while, at the same time, reducing the danger from diseases.

Tomatoes in the southern states north of Florida begin to ripen about the middle of May. As soon as the ripening period arrives, the tomato patch should be gone over every day during the shipping-season. As soon as the fruit shows a deep creamy white color, with a faint blush of pink, it is ready for harvesting. At the first of the season, the fruit may be allowed to take on a deeper color than later on.

Tomatoes are gathered in one-half-bushel baskets, lined with coarse ducking, and carried to the packing-sheds, which are generally located in the field, and then packed in four-basket crates, averaging twenty pounds, or one-third bushel, each. As a rule, there are two grades: fancy and choice. The fancy are packed with the stem end down and average about twelve to the basket. The choice are packed on the side and average about fifteen to the basket. The six-basket crate is now becoming popular in some sections.

The bulk of the crop is shipped in refrigerator cars, well iced. It is now becoming the custom, when distant markets are to be reached, to harvest the fruit as soon as it is mature, but while still quite green in color. Each tomato is wrapped with soft paper and packed in flats or six-basket carriers and shipped in refrigerator cars, with the ventilators open, but without ice. This is known as the "green-wrapped" pack. It requires 896 four-basket crates to fill a car. A fair average yield is 250 crates to the acre, although a few growers sometimes produce as high as 600. A good average price for a season is 60 cents a crate.

A medium to large tomato, one that is smooth and does not crack easily, is the best for early shipping. The Acme has been the leading variety for many years, while the Earliana, Stone, and Beauty, are grown on a small scale in some sections.

There is no standard fertilizer for tomatoes. Tomato soils of Texas are relatively rich in potash; so, as a rule, it is not necessary to use more than 1 per cent of this ingredient. Most of the Texas growers use a fertilizer containing from 8 to 10 per cent of phosphoric acid, 2 per cent of nitrogen, and 1 per cent of potash. A fertilizer containing from 400 to 600 pounds of equal parts of acid phosphate and cottonseed meal to the acre gives very satisfactory results. In the states east of the Mississippi River, the amount of potash is considerably increased; the total amount of fertilizer used to the acre is also considerably greater. From 800 to 1,000 pounds of fertilizer to the acre, containing 6 per cent phosphoric acid, 7 per cent potash, and 3 per cent of nitrogen, seems to be satisfactory. Fifteen or twenty loads of manure to the acre, applied broadcast, two or

3823. A prolific tomato, the result of training to a single stem.

three months in advance of planting the crop, will always give good results.

The damping-off fungi often attacks the young plants while they are in the hotbed. These fungi work on the stem of the plant, just where it enters the soil, causing it to shrivel and the top to fall over. Wet soil and a damp sultry atmosphere are conditions that favor the development of this disease. Frequent stirring of the soil and thorough ventilation will go a long way toward preventing the appearance of this trouble. A thin coating of tobacco dust or a mixture of three parts of lime to one of sulfur, spread over the soil after the seed is planted, will also help to hold the disease in check.

The blossom-end rot is a very destructive disease. It makes its appearance when the fruit first begins to ripen, thereby destroying the earliest and most profita-

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ble part of the crop. The fruit is attacked at the blossom-end. A small black speck first appears, which gradually increases in size until the entire fruit is affected. There is practically no remedy. The best thing to do is to gather and destroy the fruit as soon as it becomes affected.

Tomato-wilt often attacks the plants when the crop is grown on the same land more than one season in succession. Rotation should be practised as a safeguard against this disease.

The nematode is a microscopic worm which attacks the roots of a tomato plant and causes small bead-like knots to form. Ground infested with this pest should be avoided and whenever there is danger of infestation, cowpeas should not be planted on the land preceding tomatoes, as most varieties of peas encourage the development of the nematode.

The boll-worm sometimes causes considerable damage. This is a large green worm that enters the fruit near the stem-end. As soon as the fruit becomes infested, it is entirely worthless and should be removed and fed to hogs or destroyed. The boll-worm can be partially controlled by spraying with arsenate of lead; but, as it seldom makes its appearance before the fruit is full grown, there is danger in using any poison as a sprav

E. J. KYLE.

Tomato-growing under glass.

The tomato ranks next to the cucumber and perhaps next to lettuce in importance as a vegetable forcing crop. It is grown extensively under glass near all of the large cities of the North from the Mississippi River to the Atlantic coast. In some instances houses are devoted wholly to tomatoes, while in the larger number of cases other crops are grown in rotation with tomatoes. A very common practice is to produce lettuce until early spring and then the beds and benches are planted in tomatoes which will ripen during the months of May, June, and July. An early summer crop is considered more profitable than late fall and winter tomatoes, notwithstanding the fact that prices are always much lower. The larger net profits are due to larger yields obtained at much less expense, and there are no fuel bills to pay during the months of June and July and very little artificial heat is required in April and May. These remarks are not intended even to suggest that the forcing of tomatoes should be restricted to late spring and early summer, for many growers realize satisfactory profits on the fall crop and sometimes on midwinter tomatoes.

The tomato is also a popular vegetable in houses which are used solely in providing fresh vegetables at all seasons for the home table. No fruit or vegetable is more appreciated in the winter months than well-grown greenhouse tomatoes which are superior in quality to those grown in the open ground.

Numerous varieties are used for forcing purposes. English varieties have received much attention and some of them, such as Comet, have been grown on a large scale. American sorts, however, are now relied on mainly by the most extensive American growers. Bonny Best is undoubtedly taking the lead among red-fruited varieties. It is very prolific and the round smooth fruits are popular on most markets. Beauty, Globe, and Trucker Favorite are planted most extensively wherever pink or purple fruits are wanted.

In the starting of tomato plants for forcing, there should be uninterrupted growth from germination until the plants have attained full size in the beds. It is customary to sow the seed for the fall crop soon after June 20, and for the spring crop from January 15 to February 1. If a very early spring crop is wanted, the seed should be sown January 1 or even earlier. The seedlings may be planted in beds or flats at the first transplanting and the second shift should be made to pots large enough to care for the plants without crowding. A third shift to 4- to 6-inch pots is often made, and with good management this should result in very fine plants.

Most of the large commercial growers employ solid beds. Raised benches are used in some sections, especially when carnations precede the tomatoes. Solid beds require no expense for construction and maintenance and it is less difficult to maintain uniform soil-moisture conditions. Benches are an advantage when bottom heat is desired and this should be considered if the crop is to be grown at midwinter. If lettuce is grown until the tomatoes are planted early in the spring, solid beds will be found entirely satisfactory. Large pots and boxes are often used in small houses but they are not practicable on a large commercial scale.

Some persons have an idea that the tomato does well in poor soils. This is an erroneous impression, for high yields are obtained only in rich soils. It is true that the proportion of plant-food must be well balanced. An excess of nitrogen, with copious watering and high temperature, causes a rank growth of plants and a low yield. But the soil must be well provided with the mineral elements and enough nitrogen to meet the needs of the plant. If lettuce is grown until March, and enough manure employed to obtain good crops, the soil should be in ideal condition for tomatoes. It must be borne in mind that the greenhouse soil is a kind of manufactured soil, and it is important to give special attention to the supply of fiber or organic matter. The productiveness of greenhouse soils, whatever the crop may be, depends more on their physical properties than upon their chemical composition. Stable manure, used in ample quantity for lettuce, will make the best preparation for tomatoes and no additional manure will need to be applied to the tomatoes, except as a mulch. Special fertilizers have not been found necessary, and seldom an advantage, when stable manure has been used in sufficient amount to keep the soil in proper physical condition. While sandy loams are preferable for growing tomatoes under glass, any of the common soils, clays included, will give good results when properly handled.

There is the greatest diversity of practice among growers concerning planting distances. Some prefer to plant close together in rows with liberal spacing between rows. For example, a highly successful gardener sets the plants 14 inches apart in rows 30 inches apart. Some plant 2 feet apart each way with alleys at convenient distances. In large commercial houses, liberal spacing between rows is a great advantage in training the plants, pollinating the flowers, and picking the fruit.

It is possible to do a little intercropping between the tomato plants. Lettuce and radishes are sometimes grown between the rows, by starting the crops immediately after the tomato plants have been set. The practice is only fairly satisfactory because the tomato plants shade the lettuce and radishes so that the latter crops are seldom very good.

While tomato plants may be trained to two or more stems, the almost universal practice under glass is to grow single stems. (Figs. 3822, 3823.) This is easily accomplished by removing with thumb and finger all lateral branches as fast as they appear. In order that the laterals do not make too much growth, it is best to look over the plants every three or four days. When the plants attain a height of about 5 feet the tops are nipped. The stems may be supported in any convenient way. Various arrangements of wire, or wire and strings, are usually employed. A common practice is to use fairly heavy string or twine for the uprights which are tied to wires running lengthwise in the house.

Tomatoes under glass may be tilled, if it is preferred, but the better practice is to mulch the ground

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with 3 or 4 inches of fresh horse-manure which has been aërated in thin layers a few days before being applied. The mulch should be applied after most of the fruit has been set. If applied too soon, an excessive vine growth and sparse setting of fruit may result. A mulch of manure keeps the soil in a loose and friable condition; it conserves moisture more perfectly than the most thorough tillage; it furnishes plant-food every time water is applied; it prevents weed growth and saves labor in rendering tillage unnecessary.

The temperature of the house at night should not fall below 60°. From 10° to 15° higher during the day will provide excellent growing conditions. If there is bright sunshine and the ventilators are open, there need be no fear if the temperature should rise to 100°. Some fresh air should be admitted every day, but good judgment should be exercised in ventilating the houses. Excessive watering must be avoided. High temperatures, over-watering, and poor ventilation are responsible for many failures.

Some attention must be given to the pollination of the flowers. Various methods are followed. Some careful growers use a little camel's-hair brush on each flower that is likely to contain ripe pollen-grains, and the grains of pollen are thus carried from flower to flower just as bees and other insects might perform this work out-of-doors. Jarring the plants daily is usually sufficient to get a good setting of the spring and early summer crops. Whatever the method employed, the work should be done, if possible, when there is bright sunshine and the atmosphere of the house is as dry as possible.

Greenhouse tomatoes have certain enemies which must be controlled if a satisfactory crop of fruit is desired. Steam sterilization of the soil previous to setting the plants is practicable in most large greenhouses. This is by far the most effective means of destroying the nematodes which cause an abnormal development of the roots and interfere with the nutrition of the plants. Steam sterilization also helps to prevent some of the diseases to which the tomato is subject. Blight, mold, and the œdema are among the most serious diseases. Frequent and thorough application of bordeaux mixture is valuable in controlling various diseases. The white-fly is the most destructive insect pest. It may be controlled by fumigating with hydrocyanic gas.

Some of the most successful growers are able to obtain yields of ten pounds to the plant for the spring crop. This, however, is considerably above the average when the entire country is taken into account. Six pounds to the plant, for the spring crop, is a good yield, and four pounds for the winter crop is considered satisfactory. An average of 10 cents a pound for the spring crop makes it a profitable undertaking, and 30 cents a pound is not too much for the winter crop.

The greenhouse tomato should be of the highest quality and special care should be exercised in marketing it. Small packages holding about five pounds are preferable. The tomatoes should be clean and wrapped in paper bearing the name of the grower. The grower should be able to guarantee every specimen which is packed in the number 1 grade.

R. L. WATTS.

TOMATO, HUSK: *Physalis.* **Strawberry T.:** ***Physalis Alkekengi*** and *P. pubescens.* **Tree T.:** *Cyphomandra.*

TOMMASÍNIA: *Angelica.* The following species, in the lists under Tommasinia, should be entered with Angelica in Vol. I, p. 287. **Angélica verticillàris,** Linn. (*Tommasínia verticillàris,* Bertol. *Peucédanum verticillàre,* Koch). Advertised in this country as a lawn plant. It is a hardy perennial, about 1 ft. tall, with many small yellow-green fls.: lvs. 3-pinnate, the lfts. ovate, acute-serrate and the lateral ones often 2-lobed and the terminal one 3-lobed, the petiole much dilated at base. Piedmont region, S. Eu.

TOOLS: *Machinery and Implements,* Vol. IV, page 1939.

TORÈNIA (named for Olaf Toren, clergyman; traveled in China 1750–1752 and discovered *T. asiatica*). *Scrophulariàceæ.* Glabrous, pubescent or hirsute annual or perennial herbs, mostly low, branching and somewhat decumbent, grown sometimes in the warmhouse for winter bloom, but mostly grown as garden annuals.

Leaves opposite, entire, crenate or serrate: racemes short, few-fld., terminal or false-axillary; calyx tubular, plicate or 3–5-winged, apex obliquely 3–5-toothed or 2-lipped; corolla-tube cylindrical or often broadened above, 2-lipped; stamens 4, perfect, in pairs of unequal length: caps. oblong.—About 33 species, Trop. and E. extra-Trop. Asia and Trop. Afr.

Torenias are of easy cultivation and are very useful for window-boxes, low borders, or even for large masses. The flowers are not large but the plants are floriferous and keep in good leaf and flowers from spring to frost. *T. Fournieri* has the best habit for a bedding plant, but it may be bordered with *T. flava.* They are easily raised from seed, sown indoors or in the open, but may also be grown from cuttings.

3824. Torenia asiatica. (×⅓)

In Florida *Torenia Fournieri* is an excellent substitute for the pansy, which is cultivated only with difficulty so far south. Young plants come up by the hundreds around the old plants from self-sown seed during the rainy season. The species can also be propagated with great ease by cuttings. The torenia shows its full beauty when planted in beds or borders or in masses in front of small evergreen shrubs. It flowers abundantly throughout the summer, and even late in fall isolated flowers may be found. The best results are obtained by treating it as an annual. Any good and rich light soil seems to meet its requirements. It succeeds almost everywhere but prefers shade and moisture. It even grows luxuriantly in wet places along ditches and water-courses where forget-me-nots grow in the North. If such localities, however, are very shady, the flowers, though much larger, are neither produced so abundantly nor are they colored so brightly as in sunny situations. On the other hand, it is sometimes found in such dry positions, where only cacti and yuccas manage to live, that one can scarcely understand how it is able to succeed. In good soil the torenia attains a height of 8 to 10 inches, and when planted about 8 inches apart soon covers the ground entirely. There is already a great variety in colors, but the typical plant has beautiful light blue and royal purple flowers, with a bright yellow throat, in texture rivaling the most exquisite velvet. (H. Nehrling.)

A. *Fls. mainly yellow.*

flàva, Buch.-Ham. (*T. Baillonii,* Godefr.). Usually decumbent and creeping: lvs. 1–2 in. long, ovate to oblong, coarsely crenate; petiole half as long as the blade or less: fls. axillary and solitary or scattered at the ends of the branches in pairs on an erect rachia; corolla-

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tube red-purple above, yellow beneath; corolla-limb bright golden yellow with a purple eye. India and E. Asia. B.M. 6700. F. 1883, p. 55.

AA. *Fls. mainly blue or white.*

B. *Lvs. cordate-lanceolate.*

Fournièri, Lind. (*T. edéntula*, Hort., not Benth.). Low, bushy, usually annual, becoming nearly 1 ft. high: st. 4-angled: lvs. petioled, cordate-lanceolate, 1–1½ in. long, crenate-serrate; petiole ½in. long: corolla-tube narrow, yellow; corolla-limb 2-lipped, the posterior lip not cut, palé blue, the anterior 3-lobed; lobes round-obtuse, dark purplish blue, the anterior lobe marked with a yellow blotch. I.H. 23:249. R.H. 1876, p. 465. B.M. 6747. G. 1:58. Var. **álba,** Hort. (var. White Wings), has pure white fls. A.F. 5:401. G.M. 36:87. Var. **compácta,** Hort., is a more compact form than the type and rather larger-fld. G.W. 10, p. 610. Var. **grandiflòra,** Hort., has somewhat larger fls. and is more free-flowering. Var. **speciòsa,** Hort., is a showy form offered in the trade, probably very similar to var. *grandiflora.*

BB. *Lvs. ovate or deltoid-ovate.*

asiática, Linn. Fig. 3824. Annual, erect or diffuse: st. quadrangular: lvs. ovate or ovate-lanceolate, long-acuminate, serrate, obtuse, not cordate at the base, rough to the touch: peduncles axillary, single-fld.; corolla large; tube dark purple; limb 4-lobed, of a delicate pale purple-blue, with a dark blotch on 3 of the lobes, without a yellow eye; stamens 4, the 2 longer with a subulate spur. India. B.M. 4249. Var. **pulchérrima,** Hort., has larger, dark violet-blue fls. with a white spot on the upper lip. G.Z. 4:96.

atropurpùrea, Ridley. Lvs. ovate or ovate-deltoid, ¾–1½ x ½–¾in., short-petioled, serrate: fls. usually solitary on peduncles at the ends of the branches; calyx narrow, wingless; corolla dark purple, 1½ in. long, tube narrow at the base, much exserted, enlarged and curved above, limb about 1 in. across with 4 rounded lobes. Malay Penins. B.M. 8388.

F. Tracy Hubbard.†

TORRÉYA (named for Dr. John Torrey, one of the most distinguished of the earlier American botanists; 1796–1873). Syns., *Tùmion, Caryotáxus. Taxàceæ.* Ornamental evergreens, grown for their handsome foliage and interesting habit.

Strong broad trees: lvs. 2-ranked, linear or linear-lanceolate, with 2 narrow glaucous lines beneath, becoming fulvous with age; when bruised the foliage emits a pungent or fetid odor except in *T. grandis:* fls. dicœcious, rarely moncœcious; staminate fls. ovoid or oblong, composed of 6–8 whorls of stamens, surrounded at the base by bud-scales; pistillate fls. consisting of a solitary ovule surrounded at the base by a fleshy aril and several scales: fr. drupe-like, consisting of a rather large seed, with thick woody shell entirely covered by a thin fleshy aril.—Four species in N. Amer. and E. Asia. The hard, strong, and close-grained wood is much valued in Japan for cabinet-making and building. It is very durable in the ground. In this country it has been used for fence-posts.

The torreyas are handsome evergreen trees, with spreading usually whorled branches, clothed with yew-like two-ranked dark green foliage; the fruits are drupe-like and about 1 inch long. They are but little known in cultivation and rarely seen in a flourishing condition. The Japanese *T. nucifera* is the hardiest and has proved fairly hardy as far north as Massachusetts; also *T. grandis* survives in very sheltered positions in the vicinity of Boston, but the other two species are much tenderer. Torreyas grow best in shaded and sheltered positions and in a somewhat moist loamy soil. Propagation is by seeds; also by cuttings and by grafting on Cephalotaxus. Plants raised from cuttings grow very slowly and usually remain bushy. For cions, terminal shoots should be selected.

A. *Branches, 2 years old, yellowish green or yellowish brown.*

B. *Lvs. linear, emitting a fetid odor when bruised.*

taxifòlia, Arn. (*Tùmion taxifòlium*, Greene). Fig. 3825. Tree, attaining 40 ft., with spreading, slightly pendulous branches, forming a rather open pyramidal head: bark brown, tinged orange: lvs. linear, acuminate, dark or dark yellowish green above, with narrow white lines beneath, ¾–1½ in. long: fr. obovate, dark purple, 1–1¼ in. long. Fla. S.S. 10:512.

BB. *Lvs. linear-lanceolate, without strong odor.*

grándis, Fort. (*T. Fàrgesii*, Franch. *Tùmion grándе*, Greene). Tree, occasionally to 80 ft. high, sometimes shrubby: lvs. linear-lanceolate, ½–1 in. long and ⅛in. broad, bright green and lustrous above, with 2 white lines beneath: fr. ovoid or globose, ¾–1 in. long. China. R.H. 1879, p. 173. G.C. II. 22:681.

AA. *Branches, 2 years old, reddish brown: lvs. emitting a pungent aromatic odor when bruised.*

B. *Length of lvs. 1–3½ in., shape linear.*

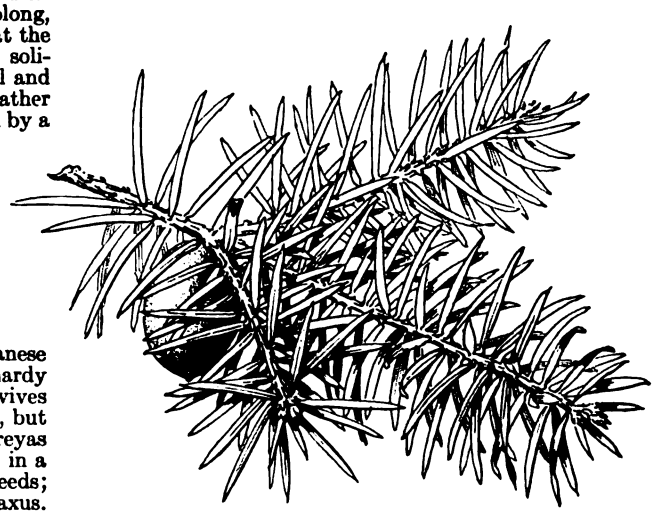
califórnica, Torr. (*T. Myristica*, Hook. f. *Tùmion califórnicum*, Greene). California Nutmeg. Tree, attaining 70 or occasionally 100 ft., with spreading, slightly pendulous branches, forming a pyramidal or, in old age, round-topped head: bark grayish brown, tinged with orange: lvs. linear, slightly falcate, acuminate, lustrous and dark green above, 1–3½ in. long: fr. oblong-oval or oval, light green, streaked with purple, 1–1½ in. long. Calif. S.S. 10:513. B.M. 4780. F.S. 9:925. G.C. II. 24:553; III. 5:800, 801. R.H. 1875, pp. 76, 77; 1879, pp. 171, 172.

BB. *Length of lvs. ¾–1¼ in., shape lanceolate.*

nucífera, Sieb. & Zucc. Tree, usually 30 ft., but occasionally 80 ft. high, with spreading branches, forming a compact head, sometimes shrubby: bark bright red: lvs. lanceolate, acuminate, rigid and spiny pointed, very dark green above, with 2 white lines beneath, ¾–1¼ in. long and ⅛–⅙in. broad: fr. obovoid-oblong, green, about 1 in. long. Japan. S.Z. 2:129. R.H. 1873, p. 315. S.I.F. 1:15.

Alfred Rehder.

TOURNEFÒRTIA (Jos. Pitton de Tournefort, 1656–1708; one of the earliest systematic botanists). *Boraginàceæ.* A large genus comprising possibly 100 species widely scattered about the warmer parts of the



3825. Torreya taxifolia. (×¾)

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world. Mostly trees and shrubs, rarely subshrubs, with alternate simple lvs. and small fls. in terminal cymes. *T. heliotropioìdes*, Hook.=*Heliotropium anchusæfolium*, which see.

TOWNSÉNDIA (David Townsend, botanical associate of Wm. Darlington, of Pennsylvania). *Compósitæ*. Low many-stemmed herbs, nearly all of which are natives of the Rocky Mountains; sometimes planted.

Leaves linear or spatulate, entire: heads rather large, resembling those of Aster; rays in 1 series, from violet to rose-purple or white and blooming from early spring to summer.—About 17 species. The annual or biennial species have larger heads than most of the perennials. Judging from the literature, the largest-fld. of the perennials are *T. condensata*, *T. Wilcoxiana*, and *T. Rothrockii*, 3 species which seem not to be in cult. as yet. The species mentioned below are presumably among the most desirable of the genus. They are offered by collectors of Colo. wild flowers. As a genus, Townsendia is distinguished mainly by its achene, which is commonly beset with bristly duplex hairs, having a forked or glochidiate-capitellate apex. Townsendia is practically unknown to floriculture. For fuller account, see Gray's Synoptical Flora of North America and Coulter and Nelson's Manual of Rocky Mountain Botany.

grandiflòra, Nutt. Biennial or perennial, 9–18 in. high: sts. spreading from the base, sometimes branching also above: upper lvs. often linear: bracts of involucre conspicuously attenuate-acuminate and scarious-margined: heads large; rays ½in. long, bright blue or violet. Summer. Foothills W. Neb. to Colo. and New Mex.

exscàpa, Porter. Nearly stemless perennial with sessile heads surrounded and surpassed by the linear lvs.: heads ¾in. across; rays white or purplish-tinged; involucral bracts narrowly lanceolate, mostly acute; pappus-bristles very setose. April, May. Dry hills, plains, or mountains, Sask. to Rockies, south to New Mex. and Ariz.—Known as "Easter daisy" in Colo.

T. condensàta, Parry. Very lanuginous: lvs. spatulate-obovate, crowded around the large, broad, sessile heads: rays 100 or more, narrow. Wyo.—*T. Róthrockii*, Gray. Lvs. spatulate, rosulate around the solitary head which is closely sessile at surface of ground, or at length with 1 or 2 additional heads from same crown. Colo.—*T. Wilcoxiàna*, Wood. A small stemless plant: lvs. in rosettes, spatulate, hairy: fl.-heads yellow, on short scapes, ½in. across. Dry plains and hills, Okla. to Colo. WILHELM MILLER.

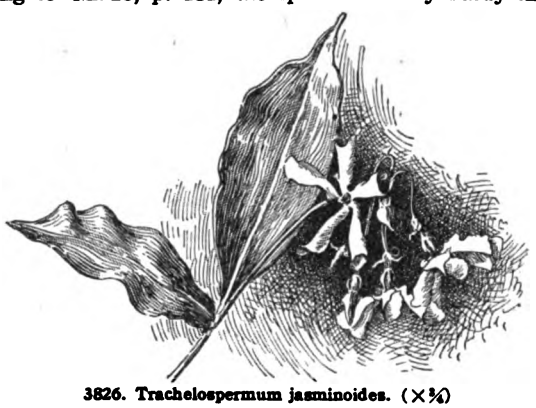
TOXICODÉNDRON (Greek, *poison tree*): *Hyænanche*, but by some retained as the tenable name. This Toxicodendron dates from 1796, but the Toxicodendron of Tournefort and Miller is much earlier and is revived by some botanists for the poison sumac and poison ivy (*T. Vernix* and *T. radicans*) and their kin but which in this book are still retained in Rhus. *T. capense*, Thunb., a very different plant and one of the Euphorbiaceæ, is treated under Hyænanche, Vol. III, page 1618.

TOXICOPHLÆA: *Acocanthera*.

TÓXYLON: *Maclura*.

TRACHÈLIUM (Greek, *trachelos*, neck: from its supposed efficacy in diseases of the throat). *Campanulàceæ*. THROATWORT. Perennial herbs or subshrubs, glabrous or hispid, hardy but not much grown: sts. sometimes tall and rather simple, with the fls. numerous, in a much-branched corymbose panicle, sometimes short, many-stemmed or cespitosely much branched, with the fls. rather umbellate at the ends of the branches: fls. blue; calyx-tube adnate, obovoid or subglobose, angulate; limb 5-parted, lobes narrow; corolla narrowly tubular, top shortly 5-lobed; ovary inferior, 3- rarely 2-celled, many-ovuled: caps. subglobose, angulate, membranaceous; seeds small.—About 6 or 7 species, Medit. region. Prop. by seeds or cuttings.

cærùleum, Linn. A half-hardy biennial or perennial, 1–3 ft. high: lvs. ovate, acuminate, unequally serrate: fls. blue or white, in dense terminal cymes, in late summer. Shaded places in S. Eu. B.R. 72. Gn. 28, p. 181; 47, p. 303; 51, p. 84. J.H. III. 50:17.—An attractive late-flowering perennial suited to cult. as an annual. According to Gn. 28, p. 181, the species is fairly hardy in England, but young plants are more floriferous than old ones. Seed may be sown in March. The plant is easily prop. by cuttings. According to Gn. 47, p. 303, plants from cuttings are dwarfer than seedlings.



3826. Trachelospermum jasminoides. (×¾)

F. W. BARCLAY.

TRACHELOSPÉRMUM (Greek, *neck* and *seed*, referring to the fact that the seed has a neck). Syn., *Rhynchospérmum*. *Apocynàceæ*. Glabrous or slightly tomentose-puberulent shrubs, the typical species tall-climbing, grown in the warmhouse and a favorite out-of-doors in the South.

Leaves opposite, distantly feather-veined: cymes lax, terminal or pseudo-axillary: fls. white; calyx small, 5-parted, with 5–10 scales or glands inside at the base; corolla salver-shaped, tube cylindrical, 5-lobed, lobes oblong, twisted to the left, overlapping to the right; disk annulate, truncate or 5-lobed; ovary 2-carpelled: follicles elongate, slender, terete.—About 16 species, E. Asia and Malaya.

Trachelospermum is a most satisfactory greenhouse shrub for a general collection. It requires no special treatment, except that the plants should be kept on the dry side during the winter. It requires several years to work up a good-sized specimen. Young plants should be given warmhouse treatment and encouraged to grow. Large well-established specimens thrive in a coolhouse. In summer the pots may be plunged outdoors in a partially shaded position. The species is propagated by cuttings of half-ripened wood taken with a heel in spring. The star jasmine is one of the many good old standard greenhouse plants that are too little seen nowadays. The specimens require considerable room, and the gardener is sometimes compelled to keep them in a cold pit until the chrysanthemum season is over, although this treatment is not to be advised. It is a tender evergreen shrubby climber from China, with fragrant white five-lobed flowers. It is a favorite in the South, where it is grown out-of-doors and known as the "confederate jessamine." In northern conservatories it is generally known under its synonym, Rhynchospermum. Handsome specimens may be grown in large tubs, making dense bushes 3 to 4 feet high and as much in diameter. (Robert Shore.)

jasminoìdes, Lem. (*Rhynchospérmum jasminoìdes*, Lindl.). STAR JASMINE. Also called "Confederate," "Malayan" or "African" Jessamine. Fig. 3826. Tender, evergreen, climbing shrub: lvs. short-stalked, ovate-lanceolate, acute, glabrous: peduncles much longer than lvs.: calyx-lobes reflexed; corolla-tube contracted

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below the middle; several jagged scales at base of corolla; 5 large glands at base of ovary, 2 united, 3 free. S. China. B.M. 4737. Gng. 5:132. Gn. 41, p. 507. J.F. 1:61. R.H. 1902, p. 367. G. 37:191. Var. **variegàtum**, Hort., has lvs. of green and white, tinged red.

T. divaricàtum, Kanitz (T. crocostomum, Stapf). Similar to T. jasminoides in habit, but differs in having slightly smaller buff or pale orange-colored fls. with exserted stamens, pointed in bud, and smaller lvs. Japan, Korea. G.W. 12, p. 415.—It is more hardy than T. jasminoides.

WILHELM MILLER.

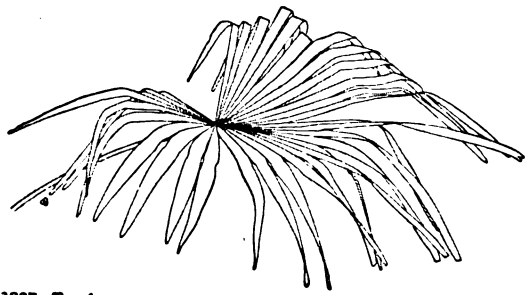
TRACHYCÁRPUS (Greek, *rough* or *harsh* and *fruit*). *Palmàceæ*, tribe *Coryphèæ*. Indoor and outdoor palms, one of which is widely grown and very hardy.

Tall unarmed palms: lvs. suborbicular or reniform, folded, many-cut; segms. narrow; rachis none: spadices many between the lvs., stout, branched; spathes many, sheathing, coriaceous, tomentose, compressed; bracts minute: fls. small, polygamo-monœcious; sepals 3, ovate; petals 3, broadly ovate, valvate; stamens 6; carpels 3: drupes 1–3, globose or oblong.—About 4 species, Himalayas, China, and Japan. Monographed by Beccari in Webbia 1:41–72 (1905).

Fortune's palm (*T. excelsa* or *T. Fortunei*) is grown both indoors and out in America wherever palms are grown, although it is not one of the most popular species with northern florists. It is grown throughout California and even as far north as Oregon. It is commonly known by the name of Chinese windmill palm in southern California. There are two types of trachycarpus, those which have the trunks covered with old leaf-sheaths—the Himalayan type—and those which have smooth polished trunks—the far-eastern species.

excélsa, H. Wendl. (*T. Fórtunei*, H. Wendl. *Chamærops excélsa*, Thunb. *C. Fórtunei*, Hook. f.). FORTUNE'S PALM. Fig. 3827. Trunk robust, clothed with old lf.-sheaths: lvs. nearly orbicular; segms. numerous, ensiform: fls. clustered 2–4 on a tubercle: fr. transversely globose-reniform, deeply umbilicate. Upper Burma, China, and Japan; will grow in the open in Ga., withstanding 10° F.—This description follows Beccari, who refers *T. Fortunei* to *T. excelsa*. Hooker in founding *T. Fortunei* (B.M. 5221) speaks of it as a more robust tree than *T. excelsa*. The latter (which is from Japan) is said to have smaller and stiffer lvs., less deeply divided (usually only about to middle) with stiff segms., while *T. Fortunei* (China) has lvs. divided much below the middle (as in Fig. 3827), and the segms. more flaccid at least in older lvs. This group needs further study botanically, and also horticulturally in this country.

Martiàna, H. Wendl. (*T. Khasiàna*, H. Wendl. *Chamærops Martiàna*, Wall.). Trunk slender, tall, annulate-scarred, for the most part naked: lvs. nearly orbicular, divided to the middle into numerous segms.: female fls. solitary, sessile: fr. oblong-elliptic, rather compressed, rounded at both ends; seeds deeply sulcate. Himalaya region, Khasia, Burma, and Assam.



3827. Trachycarpus excelsa. The leaves finally become 4 to 5 feet across.

nàna, Becc. Subacaulescent: lvs. deeply many-parted, glaucescent beneath; segms. shortly bidentate at the obtuse apex: female fls. globose-ovate: fr. reniform, umbilicate and superficially sulcate. China.

Tàkil, Becc. Trunk robust, strongly clothed with old lf.-sheaths: lvs. persistent, nearly orbicular; segms. numerous, ensiform, shortly bifid or deeply and irregularly 2-parted: female fls. clustered 2–4 together: fr. transversely reniform, deeply umbilicate. Himalayas.

F. TRACY HUBBARD.

3828. Trachymene cærulea.

TRACHYLÒBIUM (Greek, *rough* and *pod;* the upper surface of the pod is tuberculate-roughened). *Leguminòsæ*. Unarmed trees: lvs. with 2 lfts. which are coriaceous; stipules caducous: fls. white, panicled at the ends of the branches; calyx-tube disk-bearing, narrow-turbinate, segms. 4; petals 5, sometimes the 3 upper clawed and suborbicular, the 2 lower minutely scale-like, sometimes all subequal and clawed; stamens 10, free; ovary short-stipitate: pod ovoid-oblong, thick-coriaceous, warty-rugose, indehiscent.—Three species, Trop. Afr., Mascarene Isls., and Trop. Asia. *T. verrucòsum*, Oliver (*T. Hornemanniànum*, Hayne). Tree wholly glabrous excepting the tawny or silky pubescent infl.: lfts. 1-paired, obliquely oblong or elliptical, acuminate or apiculate: panicles overtopping the lvs.; calyx-segms. obovate-elliptical or oblong; petals posterior and lateral subequal, anterior equal or rudimentary: pod 1–2-seeded, oblong or obovoid, 1¼–2 in. long. Mozambique and Madagascar. Gt. 51, p. 633. *T. verrucosum* has the anterior petals nearly equal the rest; *T. Hornemannianum* has them rudimentary.

F. TRACY HUBBARD.

TRACHYMÈNE (Greek, *rough membrane*, alluding to the fr.). *Umbellíferæ*. Hirsute or rarely glabrous annual or perennial herbs, used as garden annuals: lvs. ternately dissected or rarely undivided; stipules none: umbels simple: fls. white or blue; calyx-teeth minute or obsolete, rarely 1–2, subulate; petals entire, obtuse; disk flat: fr. laterally compressed, usually flat.—About 25 species, mostly Australian but a few from Borneo, New Caledonia, and Celebes.

cærùlea, R. Graham (*Didiscus cærùlea*, DC.). Fig. 3828. An erect annual about 2 ft. high, somewhat

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hairy: lvs. 1-2-triparted, with linear, acute, 3-cut lobes: peduncles long, bearing an umbel 2–3 in. across of very numerous blue fls.; calyx-teeth obsolete; petals unequal, the external being longer. July–Oct. Austral. B.M. 2875. B.R. 1225. G.C. III. 49:114. G. 29:127. Gn.W. 25:327.

F. W. BARCLAY.

TRADESCÁNTIA (named for John Tradescant, gardener to Charles I; died about 1638). *Commelinàceæ*. SPIDERWORT. Perennial hardy herbs, varying greatly in habit from erect and bushy to trailing and rooting at the nodes, grown for their ornamental value both out-of-doors and in the greenhouse.

Stems simple or diffusely branched: lvs. various: cymes simple, sometimes umbellate or densely paniculate: fls. more or less pedicelled, few or numerous, rarely solitary, red, blue, or white; sepals distinct, concave, green or colored; petals distinct, obovate or orbicular; stamens 6, all usually perfect; ovary 3-celled with 2 superposed ovules: caps. loculicidally dehiscent.—About 90 species, all American, ranging from Manitoba to Argentina. The genus was monographed in 1881 by C. B. Clarke (DC. Monogr. Phaner. 3). The genus Zebrina, usually confounded with this by gardeners, differs, among other things, in having a tubular perianth.

To horticulturists, tradescantias are known as hardy herbs, coolhouse plants, and warmhouse plants. *T. virginiana* is the best known of the hardy species, withstanding the climate of the northern states. The wandering Jew of greenhouses and hanging-baskets, usually known as *T. tricolor*, is partly *T. fluminensis* and partly *Zebrina pendula*. *T. Reginæ* is perhaps the best known warmhouse species at present, although various species may be expected in botanic gardens and the collections of amateurs. The glasshouse species are essentially foliage plants. Several species have handsomely striped leaves. All tradescantias are free growers, propagating with ease from cuttings of the growing shoots.

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A. *Plant prostrate, rooting at the joints.*

1. **fluminénsis**, Vell. (*T. múndula*, Kunth. *T. albiflòra*, Kunth. *T. rèpens*, *T. rèpens vittàta*, *T. viridis*, *T. víridis vittàta*, *T. víridis Goèschkei*, *T. prostràta*, *T. procúmbens*, *T. striàta*, Hort. *T. tricolor*, Hort., in part. *T. myrtiflòra*, Hort.). WANDERING JEW in part. Figs. 3829, 3830. Glabrous, with shining sts. and lvs., the nodes conspicuous, trailing, or the ends of the shoots ascending: lvs. ovate-acute, without distinct petiole, ciliate at the very base, the sheaths ¼–⅜in. long: fls. white, hairy inside, the 6 stamens all alike, borne several together in a sessile cluster subtended by 2 unequal lvs. or bracts, the pedicels not all of same age. Cent. Brazil to Argentina. Gt. 16, p. 297. G.W. 13, p. 558.—One of the commonest of greenhouse and basket-plants. In greenhouses, usually grown under the benches. When the plants grow very vigorously and have little light, they are usually green, and this is the form commonly known as *T. viridis*. There are forms with lvs. striped yellow and white, but these colors usually do not hold unless there is abundance of sunlight. In light places, the lvs. become red-purple beneath. Very easily prop. by cuttings or pieces of shoots at any time of the year. The plant needs plenty of moisture in order to grow vigorously. Three plants are known as wandering Jew, and although they belong to 3 genera, it is not easy to tell them apart when not in flower (Fig. 3830). These plants are *Tradescantia fluminensis*, sheaths hairy or ciliate only at the top, fls. white; *Zebrina pendula*, sheaths hairy throughout or at least at base and top, lvs. redder beneath and always colored above, fls. rose-red; *Commelina nudiflora*, sheaths glabrous, fls. blue. The first two are tender to frost; the last is hardy in the open ground in Cent. N. Y. All of them are used for baskets and vases. The first two are best known and are the plants commonly called wandering Jew. All of them may have striped foliage. See *Commelina* and *Zebrina*.

AA. *Plant erect, or ascending from a decumbent base.*

B. *St. none, or scarcely rising above the ground.*

2. **fuscàta**, Lodd. (*Pyrrhèma Lóddigesii*, Hassk.). Stemless, brown-tomentose or hairy: lvs. 6–8 in. long, oblong-ovate, entire, about 7-nerved, short-petioled: fls. blue or blue-purple, 1 in. or more across, borne in the midst of the lvs. on very short pedicels; stamens 6. S. Amer. L.B.C. 4:374. B.R. 482. B.M. 2330.

3829. Wandering Jew.—Tradescantia fluminensis. (Natural size.)

BB. *St. evident, usually branching (often very short in T. brevicaulis).*

C. *Lvs. distichous (in 2 rows).*

3. **Reginæ**, Lind. & Rod. Stiff-growing upright plant: lvs. lanceolate-acuminate, sessile, set closely on opposite sides of the st. and spreading nearly horizontally, about 6 in. long, the center purplish crimson, with feathered border, the space toward the margins silvery, the very edge of the lf. darker, the under side purple. Peru. I.H. 39:147; 40:173 (3); 41, p. 14. G.C. III. 11:699; 13:477. Gn.W. 8:693. R.B. 19:113.—Intro. into Belgium from Peru in 1870. Named for the Queen of the Belgians. It was intro. as *Dichorisandra Reginæ*, which see, p. 1003.

CC. *Lvs. not distichous (in several rows).*

D. *Infl. not peduncled.*

E. *Plants villous.*

4. **brevicaùlis**, Raf. Villous, 1 ft. or less high, sometimes nearly acaulescent: lvs. mostly from near the ground, linear-lanceolate, more or less ciliate: fls. about 1 in. across, blue or rose-purple, in a 4–12-fld. umbel.; pedicel slender, 1–2 in. long; sepals ovate-lanceolate, villous. Ky. to Mo.

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EE. *Plants glabrous.*

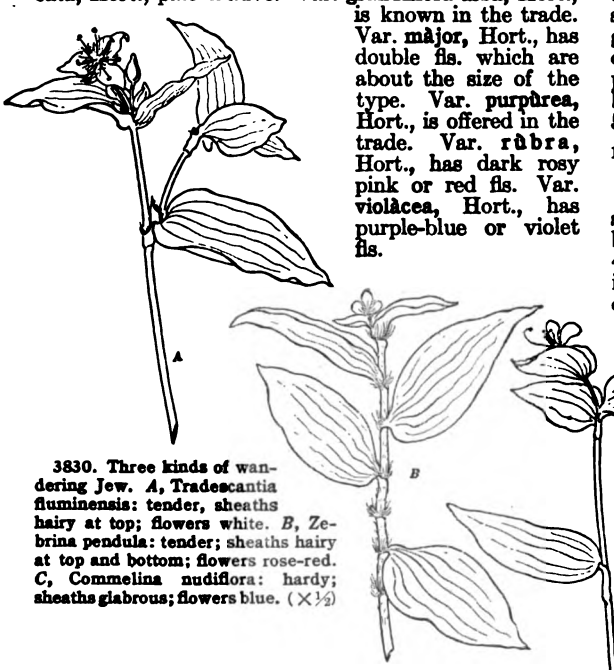
F. *Blades ovate.*

5. **naviculàris,** Ortg. Stoloniferous: st. creeping, geniculate-ascending, glabrous: lvs. sessile, ovate, acute, glabrous: fls. bright rose, in terminal umbels which are sessile; sepals spreading, keeled; petals broadly ovate. Peru. Gt. 26:901.

FF. *Blades linear to lanceolate.*

6. **reflèxa,** Raf. Slender, glabrous or nearly so: lvs. narrow, linear-attenuate from a lanceolate base: umbels terminal; bracts soon deflexed: fls. blue; sepals ovate-lanceolate, glabrous or with a tuft of hairs. Wet places, Ohio to Mich., Minn., Kans., Texas, and S. C.

7. **virginiàna,** Linn.; also spelled *virginica* (*T. montàna*, Shuttlw., not Heyne. *T. tùmida*, Lindl.). COMMON SPIDERWORT. Erect, branching, 1–3 ft., glabrous or nearly so: lvs. conduplicate, very long linear-lanceolate (6–15 in. long), clasping: umbels several-fid., terminal, the pedicel recurving when not in bloom: fls. violet-blue, in various shades, 1–2 in. across, produced freely nearly all summer; sepals villous. N. Y. to S. D., Va., and Ark. B.M. 105; 3546 (as *T. caricifolia*). L.B.C. 16:1513 (as *T. elata*). J.H. III. 49:373. B.R. 26:42. H.U. 2, p. 129.—An exceedingly variable plant. Var. **álba,** Hort., is a white-fid. form. B.M. 3501. Var. **álba grandifìdra,** Hort., is offered in the trade. Var. **álba màjor,** Hort., appears in the trade. Var. **atrosanguínea,** Hort., has dark red fls. Var. **cærùlea,** Hort., has bright blue fls. Var. **cærùlea plèna,** Hort., is a double-fid. form. Var. **cárnea,** Hort., is offered in the trade. Var. **coccínea,** Hort., has bright red fls. Var. **congésta,** Hort., has purple fls. Var. **delicàta,** Hort., pale mauve. Var. **grandifìdra álba,** Hort., is known in the trade. Var. **màjor,** Hort., has double fls. which are about the size of the type. Var. **purpùrea,** Hort., is offered in the trade. Var. **rùbra,** Hort., has dark rosy pink or red fls. Var. **violàcea,** Hort., has purple-blue or violet fls.



3830. Three kinds of wandering Jew. *A*, Tradescantia fluminensis: tender, sheaths hairy at top; flowers white. *B*, Zebrina pendula: tender; sheaths hairy at top and bottom; flowers rose-red. *C*, Commelina nudiflora: hardy; sheaths glabrous; flowers blue. (×½)

8. **occidentàlis,** Smythe (*T. virginiàna* var. *occidentàlis*, Brit.). Slender, 1 ft. high: lvs. narrowly linear, involute, base often enlarged and scarious: fls. blue or roseate; sepals glandular-pubescent. Iowa to Neb., Texas, and New Mex.

DD. *Infl. peduncled.*

E. *Fls. white.*

9. **geniculàta,** Jacq. (*T. hypophæa*, Koch & Bouché). Procumbent, sts. geniculate, elongate, pilose: lvs. ovate-oblong, 7–10 x 4–6 lines, pilose, violet-brown beneath: fls. small, white, terminal; sepals ovate-lanceolate, base cuneate. Trop. Amer. G.W. 13, p. 558.

EE. *Fls. rose or purplish.*

F. *Stamens unequal, 3 long and 3 short.*

10. **elongàta,** Meyer. Nearly glabrous, procumbent and rooting at the base, then suberect to the height of 1–2 ft.: lvs. lanceolate or oblong-lanceolate, acuminate, sessile, light glaucous-green above and striped with silver, reddish purple beneath: peduncles 1–5, terminal: fls. rose-colored, the sepals green. Trop. Amer.

3831. Tradescantia Warscewicziana.

FF. *Stamens all equal or nearly so.*

G. *Lvs. narrowly linear: sts. tufted.*

11. **ròsea,** Vent. Slender and nearly or quite simple, glabrous, 12 in. or less tall: lvs. very narrow-linear: bracts short and scale-like: fls. ½–¾in. across, rose-colored. Md. to Mo. and south. Mn. 2, p. 36.

GG. *Lvs. lanceolate to ovate-lanceolate.*

H. *Plant with a stout caudex.*

12. **Warscewicziàna,** Kunth & Bouché (*Dichorisándra Warscewicziàna*, Planch.). Fig. 3831. Dichorisandra-like, having a stout caudex or trunk, marked by lf.-scars and finally branching: lvs. green, stiffish, 1 ft. or less long, clustered at the top of the st., recurving, lanceolate-acuminate: fls. lilac-purple, numerous in small crowded clusters along the branches of a panicle-like cluster. Guatemala. B.M. 5188. R.H. 1860, p. 136.

HH. *Plant without a stout caudex, more or less decumbent at base.*

13. **dracænoìdes,** Greenm. Roots fascicled, tuberous: sts. erect or nearly so, 8–20 in. high, simple or sparingly branched: lvs. lanceolate-attenuate to ovate-attenuate, 4–6 x ¾–1¼ in., villous-pubescent, strongly ciliate: infl. an open, oblong racemose panicle: fls. rose; sepals oblong, apex rounded; petals obovate. Mex.

T. aùreo-strìata, Hort., is offered in the trade as a form with green lvs. striped with yellow.—*T. bengalénsis*, Hort., occurs in the trade, having small, red, fleshy lvs. and blue fls.—*T. crassifòlia*, Cav. (T. iridescens, Lindl.). Something like T. virginiana, but lvs. short and broad, oblong-ovate, ciliate, as also the st.: fls. 1½ in. across, blue-purple, in terminal and axillary sessile umbels, the stamens all equal. Mex. B.M. 1598. G.W. 7, p. 91.—*T. Crássula*, Link & Otto. Somewhat succulent, ascending: lvs. thick, oblong and nearly or quite obtuse, glabrous except on the edges: fls. about ¼–½in. across, white, in terminal and lateral often stalked umbels, the calyx and pedicels hairy. Brazil. B.M. 2935. L.B.C. 16:1560.—*T. decòra*, Bull. Foliage plant: lvs. long-lanceolate, dark olive-green, with a central gray band. Brazil.—*T. discolor* is Rhœo discolor, which see.—*T. dracænæfòlia*. "A noble and rapid-growing plant, with luxuriant and handsome foliage. The lvs. in many respects resemble a dracæna and are a deep green, marked with chocolate or black. . . . When fully grown the plant will send out long runners, bearing out tufts of lvs. at the end." John Lewis Childs, catalogue 1900.—*T. lækenénsis*, Hort., is offered in the trade as a form with green and pink lvs.—*T. lanceolàta*, Hort., is offered in the trade as having large, green, downy lvs.—*T. multicolor*, Hort. See Zebrina.—*T. quadricolor*, Hort. See Zebrina.—*T. spathàcea*, Swarts., equals Rhœo discolor.—*T. suptrba*, Lind. & Rod., has oval-oblong acuminate, sessile lvs., which are dark metallic green with a white band on either side of midrib and are purple beneath. Peru. I.H. 39:155; 40:173, fig 6. Gt. 46, p. 163. Perhaps not a Tradescantia.—*T. thurìngia*, Hort., is said to have green-and-white lvs.; offered in the trade.—*T. variegàta*, Hort., is Rhœo discolor var. vittata.—*T. versicolor*, Salisb., is Rhœo discolor.—*T. vulgàris*, Hort., occurs in the trade.—*T. zebrina*, Hort., is Zebrina pendula.

L. H. B.

F. TRACY HUBBARD.†

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TRÀGIA (from Hieronymus Bock [or Tragus], a German botanist, 1498–1554). *Euphorbiàceæ*. Herbs, sometimes twining and often with stinging hairs, rarely cult.: lvs. alternate, toothed or lobed: fls. monœcious, racemose, apetalous, inconspicuous; stamens simple, generally 3; styles united above the base, with the apex free: ovules 1 in each of the 3 cells.—About 50 species of tropical and temperate regions; related to Plukenetia and Dalechampia. *T. cannabìna*, Linn., of Trop. Asia, is used for fiber to some extent. *T. volùbilis*, Linn. TWINING COWITCH, of the W. Indies, has stinging hairs. Probably not cult. Several species of Tragia are native in the U. S. J. B. S. NORTON.

TRAGOPÒGON (Greek for *goat's beard*). *Compósitæ*. GOAT'S-BEARD. Erect biennial or perennial herbs with narrow grass-like leaves and heads of yellow or purple flowers, belonging to the ligulate section of the composite family (tribe *Cichoriàceæ*).

Mostly weedy plants with a tap-root: florets perfect, with slender style-branches and sagittate anthers; pappus composed of bristles in a single series; involucre cylindric or nearly so, with approximately equal-length bracts in a single row.—Between 30 and 40 species, native to S. Eu., N. Afr., and Cent. and S. Asia. One of them is cult. for its edible tap-root (salsify) and another is now a frequent weed in this country. The fls. of these open only in the morning.

3832. Flowers of salsify or oyster plant.—Tragopogon porrifolius. (×⅓)

A. *Fls. purple.*

porrifòlius, Linn. SALSIFY. VEGETABLE OYSTER. OYSTER PLANT. Figs. 3532, 3832. Tall strict biennial, sometimes 4 ft. high when in bloom, glabrous: lvs. keeled, tapering from a broad often clasping base: fls. showy, closing at noon or before, the outer rays exceeded by the involucral scales: peduncle thickened and hollow beneath the heads. S. Eu.—Naturalized in many parts of the country, often becoming a persistent weed. See *Salsify*.

AA. *Fls. yellow.*

praténsis, Linn. GOAT'S-BEARD. More or less branched, 3 ft. or less tall: lvs. as in the preceding: outer rays exceeding the involucral scales; rays yellow, showy, about 2½ in. wide: peduncle scarcely swollen. A weed, from Eu. L. H. B.

TRAGOPŸRUM LANCEOLÀTUM var. LATIFÒLIUM: *Atraphaxis Muschketowii*.

TRAILING ARBUTUS: *Epigæa*.

TRAINING: *Pruning*.

TRANSPIRATION is the term applied to the escape of water from leaves and other parts of the plant in the form of vapor.

There is no closed "circulation" of sap in plants comparable to the streaming of blood in animals. Water which generally contains various mineral soil constituents in solution enters the roots, and most of it passes upward through the stems directly to the leaves, where it is evaporated. In plants of a succulent character, the intake often exceeds the loss, and a large amount of surplus liquid may be accumulated in various organs, from whence it may pass to the leaves in times of drought.

The movement of water set up by transpiration carries water and the contained salts to the centers of food formation in the leaves, and the evaporation process facilitates exchange of gases with the air. The evaporation also tends to equalize temperatures. That an enormous amount of work is performed by the plant in transpiration may be seen when it is known that a single sunflower plant will evaporate a pint of water from its leaves in a single day, and about seventy times this much in the course of its development. A birch tree with 200,000 leaves will transpire from 700 to 1,000 pounds of water daily in the summer. A single oak tree will throw 120 or 130 tons of water into the air during the course of a season, and an acre of beech trees containing 400 to 600 specimens will transpire about 2,000,000 pounds in a single summer. It is estimated that 98 per cent of the energy derived from sunlight by leaves is expended in the work of transpiration.

To determine the exact amount of water transpired by a plant, a specimen not more than a yard in height, growing in a pot, may be used. Set the pot on a square of oilcloth, then bring the cloth up around the pot and tie closely to the stem of the plant. This will prevent evaporation except from the shoot. Now set the prepared plant on one pan of a scale, together with a small measuring-glass, and balance. Allow the plant to remain in the warm sunshine for eight hours, then note the amount of water which must be poured into the glass to reach the original level and restore the balance: this will represent the amount of transpiration.

To demonstrate that water actually does come from the leaf, cut off a small leafy shoot of any convenient plant and thrust the base of the stem through a piece of cardboard into a tumbler of water: seal the opening around the stem with wax or gelatine: then cover the exposed part of the shoot with another tumbler and set in a warm light place. Moisture which could have come only from the leaves will soon gather on the glass. Some transpiration occurs over the entire surface of the plant, although only about one-thirtieth as much is given off by the stem as from the same amount of leaf-surface.

The structure of the leaves is such as to facilitate transpiration. The interior of the leaf is made up of a great number of loosely arranged cells which evaporate water into the air between them. The air in the leaf communicates with the atmosphere through openings called stomata, which are generally placed on the lower side of the leaf. Consequently the watery vapor diffuses out through the stomatal opening. Near the outer end of the stomatal chimneys are guard-cells which undergo alterations in form that change the size of the opening of the guard-cells and modify the rate of water loss. The position and shape of the guard-cells are affected by the age of the leaf, turgidity of the tissues, wind, and sunlight. The rate of transpiration may also be affected by cutinization or other alterations in the cell-walls through which evaporation into the stomatal chambers takes place, or by the presence of colloids retentive of water in the cells.

Species characteristic of arid regions generally have limited waterproofed surfaces with a comparatively small number of stomata. This modification is exemplified by the cacti, which transpire not more than one three-hundredth as much water as a broad-leaved plant of the same volume; and such succulents may lose as little as one forty-thousandth of their total weight by transpiration in a day. D. T. MACDOUGAL.

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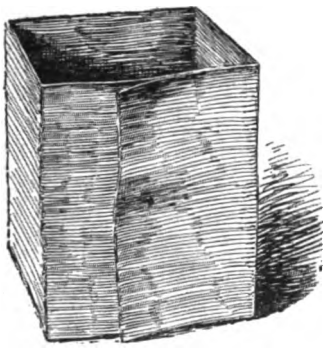
TRANSPLANTING is a general term to designate the removal of living plants whereby they may become established in new quarters.

Transplanting may be performed when the plant is in a dormant condition, as in winter, or when it is still actively growing. Small herbaceous plants are usually the only ones that are transplanted when in a growing condition, and this only when the plants are living under special garden conditions where they may have the best of attention as to watering and shading. Considered from the standpoint of the plant, transplanting is always a violent operation, for it destroys a considerable part of the root-system, loosens the plant's attachment to the soil, and arrests for the time being a large part of its progressive vital activities. To overcome these dangers, the earth into which the plant is set should be well prepared and moist, so that the plant may quickly reëstablish itself; part of the top usually should be removed to lessen transpiration, and with succulent and growing plants some shade should be provided for a time. The deeper and finer the soil, and the greater the quantity of moisture it holds, the more successful the transplanting operation will be, other things being equal. The operation is also more successful in humid regions, as in the Atlantic states, than it is in dry regions, as on the plains and westward. In the more arid parts of the country transplanting is performed as little as possible, whereas in the eastern part great quantities of annual and other garden plants are transferred from seed-beds to the open ground.

The successful transplanting of any plant depends in part on the condition of the plant itself. The younger the plant, as a rule, the better it withstands the operation. Herbaceous or growing plants that are relatively short and stocky and compact, transplant better than those that are long, "leggy," and weak. The stocky plants are better able to withstand the vicissitudes of inclement weather when they are transferred from a protected place to the open air, and they probably also have more recuperative power to make new roots and to attach themselves again to the earth. Many plants may be "hardened off" or gradually inured to sun and cold before they are transplanted. The more frequently a given plant is transplanted the more readily it endures the removal. The root-system becomes close and compact and there is relatively less injury to the roots at each subsequent removal, providing a long interval does not take place between the operations.



3833. A transplanting-box, specially designed for melons. It is made of a "flat" or splint 14 inches long and 3½ inches wide, bent at four corners and held in place by a tack. It has no bottom.

The success of transplanting also depends to some extent on the weather at the time the removal is performed. If cool, cloudy, and damp weather follows the transplanting, the plants are much more likely to live. Plants usually establish themselves more quickly in freshly turned soil, because it contains a relatively large amount of moisture. To bring the earth into contact with the roots, it should be firmed closely about the plants. This packing of the soil tends to bring the subterranean moisture upward where it may supply the roots; it also tends to increase evaporation from the surface of the soil and thereby to waste the water, although much of the moisture is utilized by the plant as it passes upward. To prevent the escape of moisture from the surface of the soil, it is customary to cover the ground with a mulch, from 1 to 3 inches in depth, of litter, sawdust, leaves, or coarse manure. When practicable the water may be saved by keeping the surface well tilled, thereby providing a mulch of earth. See *Tillage*.

In dry weather it may be advisable to water newly set plants, particularly if they are green and growing fast, as tomatoes, cabbages, and other annuals. The watering may best be done at nightfall. The water should be applied in a hole or depression about the plant or at one side of it, rather than on the surface; and the following morning the loose fresh earth should be drawn over the roots in order to provide a surface mulch and to prevent the soil from packing. Of course, this particular pains cannot be taken in large field operations.

All kinds of plants can be transplanted, but some of them remove with great difficulty. In these cases the special skill which is born of experience with these particular plants must be invoked for success. The difficulties are of various kinds. In some cases the difficulty may be a tap-root system, as in the case of the black walnut and the hickories. In these instances the plant may be prepared a year or two in advance by severing the tap-root some distance below the ground by means of a spade or other sharp instrument that is thrust underneath the crown. In other cases the difficulty is the inability of the plant to make new feeding roots quickly, as in some of the asiminas or papaws. Such plants often may be treated like the tap-rooted plants; that is, the long cord-like roots may be severed at some distance from the crown a year or two before the plants are to be removed. In other cases the inability to be transplanted is probably due to the excessive rate of transpiration from the foliage. In these cases cutting back the top rather severely and providing shade may contribute to success. In some cases the difficulties are so great as practically to prohibit transplanting.

So-called transplanting machines have been perfected within the last few years for setting small herbaceous stuff, as cabbages, tobacco, and tomatoes. These are really vehicles, drawn by horses, that open a furrow and drop a small quantity of water when the plant is inserted in the furrow by the hands of an operator who rides on the machine. The plants, already prepared for setting, are carried in a tray or hopper, and the operator places these between guards which automatically measure the distance. These machines are particularly valuable in large areas where great quantities of plants are to be set, and also in hard and dry land where it is difficult to make the proper openings with the hand and also otherwise to supply the plant with sufficient water.

For most small plants that are to be reset in small quantity, the dibber is a most useful implement to expedite the operation. (Fig. 3834.)

Plants grown in pots and small shallow boxes transplant more readily than those raised in the open soil. Particularly is this true of pot-grown plants, for the bevel or slope of the pot allows the ball of earth to be "knocked out" readily. See *Potting*. Special transplanting-boxes are on the market, to be used instead of pots, for purposes of economy. These boxes are usually made of thin basket stuff and are thrown away when the plants are taken from them for transplanting. (Fig. 3833.) The seeds are sown directly in these boxes. Melons, cucumbers, and other plants that are difficult to transplant are often grown on pieces of inverted turf, taken from old pastures.

In the case of large trees and shrubs, success often may be attained by transplanting in the winter, when a ball of frozen earth may be removed. It is usually better to give the transplanting of large trees into the hands of an expert than to attempt to perform it with

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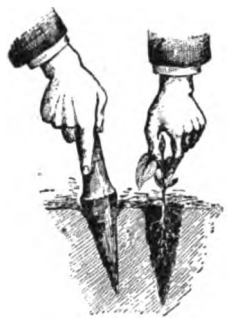
unskilled help and inefficient appliances. Only a certain proportion of the efforts in transplanting very large trees are really successful. The trees may live for several years and yet never fully recover or make satisfactory subjects. The surest and best results are usually secured only when the trees are nursery-grown and have been transplanted two or three times within a few years of their final removal. There are some species that remove from the wild with relative ease when they are of large size, among which are elms, maples, pin oak, basswood; but the large number of species do not readily recuperate from the operation. See *Arboriculture*, Vol. I, page 362.



3834. A dibber. One of the most useful implements to aid in the transplanting of small plants. The plant is dropped into a hole made by the dibber; this hole is closed by inserting the dibber at the side and moving it against the plant.

It is sometimes said that a plant cannot recover from the transplanting operation, that the severing of the roots inflicts injuries that are not outgrown, and that a new type of root-system develops. These fears appear to be groundless. In many cases the plant does not regain itself, but these instances are probably due to lack of skill in the operation rather than to any inherent difficulty in the transplanting process itself. But even if the transplanting process were found to be theoretically injurious, nevertheless it must be employed in the practice of modern horticulture. L. H. B.

TRANSPORTATION of horticultural products. Commercially, fruits and vegetables are grown primarily for profit. Whether the business of fruit- or vegetable-growing results in profit or in actual loss to the grower depends on a great many factors. Among the more important are quality and quantity of production, distance from markets, cost of transportation, the condition in which the produce reaches the markets, methods of marketing, and the supply and demand.

In present-day fruit-growing, especially when the localities of production are often thousands of miles distant from the larger markets, there is no factor of greater importance than rapid and efficient transportation. Every fruit-grower is, or should be, aware of the necessity of safe and rapid transportation, together with the delivery of perishable produce at the markets in sound attractive condition. Soundness and freedom from decay or deterioration are fundamental to profitable marketing, therefore to successful fruit-growing. All the labor and moneys invested in production are wasted if the products cannot be transported and delivered in good condition.

Transportation is the link that connects the producer with his market, his zone of distribution being determined largely by the cost of transportation and absolutely by the distance over which the produce can be shipped in sound marketable condition. This distance will necessarily vary with the variety of fruit, the localities in which grown, cultural methods, care exercised in handling and preparing it for shipment, the promptness with which it is cooled, and the temperatures maintained in transit. The factors above mentioned are the more fundamental ones governing the condition of horticultural produce in transportation. It is clear, therefore, that successful transportation depends not only on conditions in transit but on the prehandling of the produce prior to shipment. The responsibility for the condition of these products when delivered at the markets is a common one as between producers, shippers, and carriers. The very best refrigeration that is practicable cannot be expected to deliver perishable products in sound merchandizing condition that have been badly handled prior to loading or shipment. Nor can such produce properly handled be delivered in good marketable condition without adequate refrigeration in transit during warm weather or sufficient protection against freezing in the cold weather.

The railways of the United States annually pay out millions of dollars in claims on account of breakage, decay and deterioration, freezing, and other damage in transit of perishable produce. This does not begin to cover losses sustained by the shippers in claims that are not paid, or deterioration for which no claims are made, and the injurious effect on the price received for the produce actually sound. The economic losses to consumers, carriers, shippers, and producers, especially consumers and producers, who finally shoulder the greater part of the burden, are enormous. This great wastage of the nation's food-supply is an important factor in the high cost of living and is very generally one of the main reasons for losses instead of profits to the growers or producers. The most important fact in this connection is that most of these losses are unnecessary and preventable. As the decay and consequent losses occur in transit, it is of the greatest importance that growers, shippers, and carriers have a clear and accurate knowledge of the fundamental factors governing condition of fruits and vegetables in transportation.

Few commodities are more subject to decay and deterioration in transit than are fruit and vegetable crops. In considering the transportation of these products and their behavior in transit, it is absolutely essential that the fact be kept in mind that fruit and vegetables are living organisms with a definite span of life beginning in the orchard or field and ending normally in actual death-decay. It must be remembered, therefore, that, in preparing these products for shipment, in transportation, and through all stages to the ultimate consumer, one is dealing with real organisms, the life-span of which will be lengthened or shortened by methods of handling and conditions in transportation. A correct interpretation of the reasons for the losses from decay and deterioration in transit depends on accurate knowledge of types of troubles that destroy the market value of fruits and vegetables. The prevention of these losses must be based on a clear understanding as regards the relation of the development of these troubles to methods of handling prior to shipment, and to temperature conditions in transit. The types of troubles that may destroy or lessen the value of these products are of two kinds, decay and skin-blemishes. In ordinary transportation the former is by far of the most importance, while in storage skin-blemishes may be very important factors. Decay may result either from attacks by fungous or bacterial organisms, or through physiological breakdown which may be termed natural death decay. The organisms causing decay in transportation may for convenience be divided into two groups, those which are parasitic, or which may cause decay of sound uninjured fruits, and those which are saprophytic or which have not the power to attack the sound unbroken skin of fruits or vegetables. Parasitic fungi causing decay in transit are usually orchard or field diseases that ordinarily can be controlled through proper cultural sanitation practices in the fields or orchards. Saprophytic organisms are responsible for by far the largest proportion of losses due to fungous decay in transportation and can be controlled only through careful and correct handling methods in the harvesting and preparation of the fruit for shipment.

Physiological breakdown or death-decay hinges largely on proper handling methods and temperatures

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in transportation. It is plain, therefore, that the fundamental factors influencing, to the greatest extent, the behavior of fruits and vegetables in transportation come under the following heads: (1) Cultural; (2) maturity at time of picking; (3) care exercised in all handling operations; (4) promptness of cooling; precooling; (5) temperatures in transportation.

Cultural history of the crop.

In so far as cultural practices determine the crop's freedom from disease when harvested and its inherent keeping quality, are cultural operations responsible for condition of these crops in transportation. Of especial importance are the methods of orchard or field sanitation. Field or orchard diseases attacking growing fruits or vegetables very often cause serious decay in transit. Peaches from orchards or sections affected with brown-rot (Sclerotinia) or Monilia usually show serious development of brown-rot after shipment. In certain humid sections of the Pacific coast, for example, the prevalence of brown-rot makes long-distance shipment of cherries and fresh prunes an extremely hazardous venture. Certain vegetable crops, such as lettuce, celery, and tomatoes, when transported long distances, sometimes develop serious decay in transit through diseases that attack the growing crops in the fields. Decay in transportation, caused by diseases commonly affecting crops in field or orchards, can be controlled only through proper orchard- and field-sanitation practises. While the rapidity of the development of such decay in transportation can be controlled, to some extent, by quick prompt cooling and the maintenance of very low temperatures, the only real preventive lies in the control of these diseases in fields or orchards.

Maturity at time of harvesting.

The picking-maturity of peaches, muskmelons, and other quick-ripening fruits is governed largely by the distance from market and general experience as regards the carrying quality of such fruits at different stages of maturity under ordinary refrigeration. When they are to be shipped for considerable distances, the usual practice is to pick and pack them while still so green, hard, and immature as to be unfit for immediate consumption. Sometimes they are harvested in such a green state that they do not properly ripen in transit, and while not entirely worthless from a marketing standpoint, their poor eating quality necessarily results in very low prices. Fruits from certain sections have undeservedly gained a reputation for poor quality because the consumers never have had an opportunity to taste any properly matured fruit. There is no questioning the fact that if the quick-ripening fruits entering into long-distance transportation could be harvested at much nearer full maturity, that is, hard-ripe, and transported to the consumer in sound condition, both producer and consumer would benefit greatly, the former in increased returns, the latter in securing a more wholesome and palatable fruit.

The reason for the present condition is largely found in the notion that such fruits must be picked while still very green and hard to carry in sound condition to the market. To some extent this idea is well founded. Greater care, however, in all handling operations, with prompt cooling, will enable growers and shippers successfully to handle the quick-ripening fruits at more advanced stages of maturity. When precooling facilities are available, it has been demonstrated that it is not only possible but practicable to harvest such fruits as peaches and pineapples at advanced stages of maturity as will give the consumer a product possessing its maximum fine quality and wholesomeness. When such facilities are not available, much can be accomplished toward the same end through proper and careful handling, prompt loading and the stowing of the load in the car in such a way as to facilitate circulation and consequent quick cooling or refrigeration. The practicability of successfully transporting more nearly tree- or plant-ripened fruits, possessing the maximum fine quality of the variety when delivered to the consumer, will depend both on the grower and the carrier. The grower must exercise, first of all, the greatest care in handling and get his fruit under refrigeration quickly. The carriers must provide refrigeration facilities in which the product can not only be cooled faster but transported at lower temperatures than is ordinarily obtained in the average equipment. What has been said above, relative to the desirability of harvesting certain fruits at much advanced stages of maturity, does not, of course, apply to such fruits as pears, lemons, and fruits or vegetables which should be picked green in order that they may possess their maximum fine quality when finally ripened or cured.

Care in harvesting and handling.

The care exercised in harvesting and preparing horticultural products for shipment determines, to the greatest degree, its shipping or keeping quality. Extensive investigations conducted on a commercial scale by the Bureau of Plant Industry, United States Department of Agriculture, for a number of years, covering a wide range of fruits and vegetables, have clearly and conclusively demonstrated that decay in transit and after arrival at the market is due very largely to rough methods of handling. The fungous organisms causing decay gain entrance through mechanical abrasions of the skin made in picking, hauling, packing, or other handling operations. Every injury or breakage of the cells of the skin offers lodgment for fungous spores which, given proper moisture and temperature conditions, germinate and produce decay. Both high temperatures and moist atmosphere favor rapid development and growth of these organisms. Temperatures are usually fairly high during the harvesting season, as is frequently the humidity. During periods of muggy or rainy weather, the conditions are ideal for the germination and development of fungous spores, and almost every injury is certain to result in decay. The fundamental consideration, therefore, in all handling operations is the preservation of the skin in a sound and unbroken condition.

Nearly all growers and handlers of fruit or vegetables realize that rough handling, resulting in mechanical abrasions of the skin, is more or less responsible for decay occurring in transit. Few, however, have a clear idea of the extent of mechanical injuries made in ordinary commercial handling, nor do they realize fully the importance of the most careful work, or what constitutes proper and careful handling of a perishable product. In a short article it is obviously impossible to go into details as to how injuries are made in handling from field to car. The handling operations involved in the harvesting and preparation of the citrous fruit crop for shipment may serve as a very good example. In the harvesting of citrous fruits the mechanical abrasions may result from cuts made by the clippers used in severing the fruits from the tree, from contact with thorns on the trees, from dropping the fruits into the picking-sack or field-box, rough handling in loading, and jarring in hauling over rough roads or on springless wagons. Additional injury may result as the fruit goes through the washing-machines, brushes and driers, and over the sizers, and into the bins. Long sharp stems also cause much injury as the fruits roll against one another in the picking-sack, field-box, and the various operations of washing, drying, grading, and sizing. The pickers and packers, where gloves are not worn, may cause much injury through finger-nail cuts. The washing of fruit in dirty water, or slow and incomplete drying, both afford ideal or favorable conditions for infection of every injury and the consequent development of decay. The so-called soft fruits require

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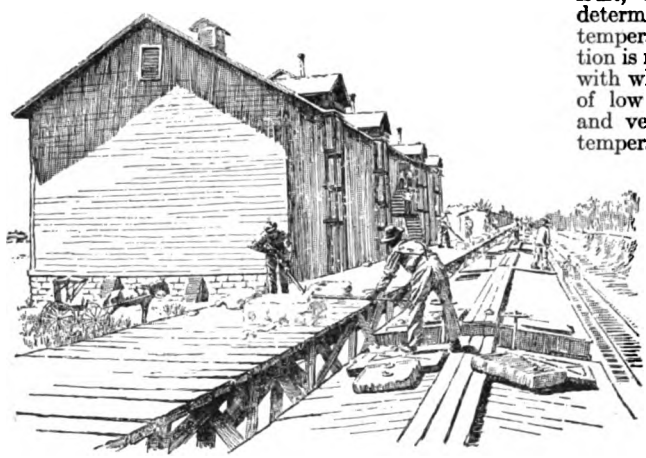
even more careful handling to avoid bruising and to preserve the skin of the fruit in a sound unbroken condition through all the operations of picking, hauling, and packing. Peaches are very commonly injured through the pickers exerting too great pressure with the thumb or other fingers when removing the fruit from the tree, by rough handling in loading, and bruising in the various operations of grading and packing. While sizers or graders have been used to a considerable extent in the handling of peaches, most of the graders now in use afford too many opportunities for injury to be universally recommended in the handling of such crops. In red raspberries, for example, the most serious decay results from too great pressure on the berry when removing it from the core. The use of three fingers instead of two minimizes the pressure and danger of injury. The inclusion of over-ripe berries in cups or crates intended for long-distance shipment is also a very prolific source of decay. The marketing or distributing zone of such fruits and berries can be extended by several thousand miles by the exercise of a little more care in picking and grading. In grapes the most serious injuries result from the loosening of the berry from the pedicel, and it requires the most careful handling, both in picking and packing, to avoid this type of injury which is chiefly responsible for the frequent excessive decay occurring in transportation.



3835. Icing cars (at the top) at one of the stations of the Fruit Growers' Express, Georgia.

Careful handling involves the exercise of thoughtfulness in the manipulation of the fruit from tree to car in order to preserve the skin of the fruit in an unbroken sound condition. It necessitates the most careful supervision of labor. It means simple and the minimum amount of machinery for washing, drying, sizing or grading, and constant attention to keep it clean and in perfect order. The whole handling problem is an economic one related to systems of both hiring and supervising labor. In citrous states coöperative associations have found it necessary to take over the field handling as well as the packing-house handling to insure uniformity of careful work. Where each grower does his own picking, the bad handling of one nullifies, to a large extent, the good work of the other, especially if the fruit from the different growers is pooled and shipped in the same cars. The success of this method of coöperative handling depends largely on having the right kind of manager and foreman, men who not only know what careful handling is and means, but who can secure such work from every man in the organization having anything to do with the physical handling of the fruit. The system of paying labor is largely responsible for carelessness in handling and decay in transit. Too much emphasis cannot be laid on quality as the tendency is at present decidedly in the direction of attaching too much importance to quantity. Quantity at the expense of quality is poor economy in the handling of any perishable fruit crop.

There is considerable question and argument as regards the best picking-receptacle, particularly as to whether picking-sacks or -bags are preferable to pails or baskets or other similar containers. For citrous fruits, and other hard thick-skinned deciduous fruits, canvas picking-bags are usually preferable. Peaches and other thin-skinned fruits, that are very liable to injury by the rubbing of one fruit against another, ought to be picked in receptacles with rigid sides. In such receptacles the fruits will not be subjected to more or less rubbing against one another as they would be in a picking-bag where every fruit necessarily moves somewhat with the movement of the picker.

Quickness and promptness of cooling.

Next to care exercised in the physical handling of the fruit, temperature is the most important factor in determining the life-span of the fruit. The question of temperature in the handling of fruits for transportation is related primarily to the promptness and rapidity with which the produce is cooled and the maintenance of low temperatures in transit. Most of the fruits and vegetables are harvested during periods of high temperatures. The physiological and chemical changes that constitute ripening proceed very rapidly at high temperatures and but very slowly at temperatures slightly above freezing. High temperatures shorten the life-span of the fruit, both through rapid ripening and the rapid development and growth of decay-producing organisms. The low temperatures retard the ripening processes as well as the germination and growth of fungi causing decay. It is, therefore, of the greatest importance that the produce be cooled as promptly and quickly as possible after removal from the tree or field. Delay of a few hours of the more quick-ripening fruits after harvesting in the field or packing-house during the heat of the day may mean the shortening of the normal life-span of such fruits by days. Prompt cooling is essential, whether this is accomplished by precooling before shipment or slower cooling in a refrigerator car. Advantage also may be taken of cool night temperatures by allowing the fruit to remain unpacked out in the open over night and packed later in the cool of the morning. More cooling can usually be accomplished this way over night than in a whole day in a refrigerator car, especially if the fruit is wrapped and tightly packed.

Precooling.

The prompt quick cooling of produce prior to shipment has been termed "precooling." It is usually accomplished by mechanical means in warehouse plants before loading in cars, or in car-precooling plants after loading. In the latter case the precooling is accomplished by forcing large volumes of cold air through the load in the car. More recently smaller warehouse plants have been built and successfully operated using ice and salt for refrigeration. As to which system is the best is still more or less of an open question and depends largely on local conditions. Warehouse plants have the advantage in so far as the cooling of the produce can be commenced immediately after packing without any delay. The cooling is usually more uniform and very often the plants are used as warehouses to hold fruits and vegetables in good condition for considerable periods when, on account of market conditions, or for any other reason, it is desirable to do so. Mechanically cooled warehouse-precooling

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plants are expensive to build and operate, and where the harvesting-season is short, the benefits from precooling must be very marked to justify the expense. The salt and ice plants were designed to meet this objection and have proved very practicable where ice can be obtained at a reasonable cost and where the daily output does not exceed a few cars. The principal objections to car-precooling plants are the delay between loading and precooling and the more or less unequal cooling of the different packages in the car. The delay incidental to finishing the loading of a car, and the switching to a precooling plant is sometimes considerable and, in some instances, the total delay may approximate, to some extent, the slow cooling under regular refrigeration. In a number of instances, where car-precooling plants are in operation, in order to minimize delays, there is too much of a tendency to cut down the actual period of precooling, which results in partial precooling only. Some of the reasons why precooling is not more universally utilized may be found in the rather heavy initial investment necessary to build a plant, and the delay in shipment necessitated by holding over for precooling. Especially is this true with deciduous fruits where, in many sections, the shipping-season is short and where each shipper is desirous of getting his fruit or produce to the market as quickly as possible.

Precooling has been utilized more in connection with the handling and shipment of citrous fruits from California than anywhere else. It has apparently been found to be profitable in the citrous industry largely because of the long orange shipping-season, and for the reason that it is utilized also to reduce the cost of transportation. Precooled fruit from the growers' warehouse plants is shipped with initial icing only during the winter and spring season, the combined cost of precooling and one icing being somewhat less than the regular refrigeration rate. In Florida, precooling of citrous fruits is more in the experimental stage. Owing, however, to the short haul in warm territory in winter, precooled fruit is usually shipped successfully without any icing whatever. Comprehensive experimental precooling investigations on a commercial basis have shown decidedly favorable results from the thorough precooling of lettuce and celery from Florida. The principal berry-growing sections in California and Washington have utilized precooling for several years with the result that they have been able not only to transport berries, such as red raspberries and loganberries, in better and sounder condition, but to widen their marketing territory greatly.

In a number of cases in which precooling has been tried on a commercial basis, the physical handling of the fruit has been too careless to result in any marked advantage from precooling. This serves to illustrate very forcibly that precooling should not be depended on to overcome difficulties arising from improper handling. Another factor of no little importance is the inability of the average refrigerator equipment to maintain sufficiently low temperatures, even under full icing, especially in the upper tiers, in transportation. The good effects of quick and prompt cooling have been nullified to a considerable extent by the rapid rise in temperature of fruits or produce while in transportation. No matter what system is employed, the full value cannot be obtained from precooling unless the produce has been properly and carefully handled in the first place. Used as a means to overcome the effect of rough handling, precooling only retards decay and deterioration and simply transfers the troubles from the first receiver at the market to the retailer or consumer. Precooling must be thorough and as uniform as possible. The refrigerator car used for the shipment of precooled produce should be sufficiently insulated to maintain reasonably low and uniform temperatures in transit.

Temperatures in transit.

The necessity for the maintenance of low temperatures in transit has already been emphasized. The question is often asked: How low ought the temperatures in a refrigerator car to be for best results? The only answer to this question is: As low as possible consistent with safety from freezing. The same principle applies as in storage. The lower the temperature above actual freezing, the more effectively are ripening and the development and growth of decay-producing organisms checked. While most of them continue to grow very slowly at temperatures of 40° F. or below, few germinate at this temperature. If, however, germination has already taken place, the best that can be expected of refrigeration is to check their growth and development sufficiently to allow of sound delivery. The necessity for prompt and quick cooling is therefore very apparent.

The cooling in an ordinary refrigerator car is usually rather slow and very unequal. It requires from six days to a week thoroughly to cool a load of oranges in transit and several days to cool wrapped deciduous fruits. Unwrapped fruits in open containers cool relatively fast because of the opportunity for free air circulation around each individual fruit. The lower tiers cool relatively fast in any load, especially near the ice-bunkers. There are marked differences in temperature between the ends and middle of the car, and between the top and bottom tiers. In the quick-ripening fruits these temperatures are reflected in the condition of the fruit in the various positions in the car. Very often the upper tiers are 15° to 20° higher in temperature than the bottom tiers and have ripened to such an extent as to make it necessary or desirable to sell them separately from the remainder of the fruit in the car.

One of the principal problems in transportation and refrigeration of fruits and vegetables in transit is to secure quicker and more uniform cooling throughout the car. This can be done, to some extent, through methods of loading and stowing and care exercised at time of loading to retain as much as possible of the refrigeration within a pre-iced car. With deciduous fruits and vegetables, cars intended for loading should be pre-iced several hours before loading begins.

The shipper in loading should not only stow the load so as to prevent shifting and breakage in transit but, first of all, so as to facilitate free circulation from both ends to the middle of the car. If crates are used, this can be done by leaving straight uninterrupted aisles between rows from one end to the other. Cleats between each layer from bottom to top will also facilitate quicker cooling. Racks so constructed as to provide a space of 4 inches between rack and floor for free circulation of cold air from each bunker toward the middle of the car underneath the load will greatly facilitate quick cooling of every package in the load. In loading fruit into pre-iced cars, it is very commonly the practice to leave both doors open during the entire period of loading. Much of the refrigeration is lost in this way which could easily be conserved if more care was exercised to open the doors only when absolutely necessary.

In so far as methods of loading and stowing are concerned, the responsibility for the safety of the load and, to some extent, its quick cooling rests on the shipper. The other factors, however, in actual transportation that have to do primarily with quick cooling and the maintenance of low temperatures in transit and freedom from breakage are factors for which the carriers must share responsibility. When properly prehandled produce has been stowed and loaded correctly, both as regards liability to shifting in ordinary freight handling and as to facilitating air circulation and quick cooling, a shipper has largely fulfilled his responsibility so far as products in transportation is concerned. Following this, the responsibility for the safe transportation of properly loaded product rests almost entirely on

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the transportation company, both as relates to freedom from breakage and efficient refrigeration. The care exercised in handling freight trains and cars in switching is mainly responsible for the condition of a properly stowed load as regards shifting, breakage, and the like. The efficiency of the refrigerator car is primarily responsible for the quickness of cooling and the maintenance of uniformly low temperatures in transit as well as liability to freezing damage in cold weather. The efficiency of a refrigerator car depends not only on the quantity, quality, and condition of insulation but on the size of the car, the kind of ice-bunkers, and facilities for effecting free circulation and quick refrigeration of all packages in the car.

Salt, as a means of securing lower temperatures in refrigerator cars, is in use extensively in the transportation of meats and similar products requiring temperatures below freezing. It has been used only very sparingly with fruits. Recent tests with somewhat modified equipment indicate that salt can be used to good advantage in securing quick cooling and in maintaining the necessary low temperatures in transit.

The methods of icing and charging for refrigeration in transit vary considerably in different sections of the country. From Pacific coast points to the East, the carriers, under certain blanket rates, assume all responsibility for refrigeration in transit from point of shipment to destination. In the deciduous fruit sections all cars, unless precooled, go out under standard refrigeration, that is, pre-icing before loading and full re-icing enroute at all regular re-icing stations to destination. The refrigeration rate is uniform on all cars to any one point. Under the standard refrigeration rate for citrous fruits, the cars are usually not iced until after loading unless otherwise requested by the shipper who pays a somewhat higher rate for pre-iced cars. With citrous fruits from California, various other rates are in effect permitting one pre-icing and a re-icing before final shipment, or precooling, and one icing with no re-icing in transit. When the growers do their own precooling and initial icing with no re-icing in transit, a charge is made only for the use of the car and freight on the ice hauled in the bunkers. In the shipment of fruits from Florida there is not only the standard refrigeration rate which calls for full re-icing at the designated icing stations enroute, but there is also another rate for half-icing, which means the refilling of the bunkers at the various icing stations to one-half of their capacity, the racks on the floors of the bunkers being raised so as to hold the ice in the upper half of the bunker. In the eastern states the so-called blanket refrigeration rate to various points is not used to any considerable extent in the shipment of fruits and vegetables. The refrigeration charge to the shipper is usually based on the amount of ice consumed in transit as shown by the carriers' records at icing stations. The shipper pays for the ice actually used and the icing is done according to the instructions furnished by him on the bill of lading. If the shipper orders full refrigeration in transit, the cars are re-iced at the regular icing stations. The shipper, however, has the option of giving other instructions if he so desires, namely, either the number of icings enroute or the icing stations at which he wishes the cars to be re-iced. Under the standard refrigeration rates, applying from the Pacific coast territory, the responsibility for refrigeration in transit rests entirely with the carriers. In eastern territory the responsibility is divided between the shipper and the carrier.

Freezing in transit.

The transportation of fruits and vegetables in sound condition in transportation is related not only to efficiency of refrigeration but protection against freezing. During protracted periods of cold weather, such as sometimes occur in the northern and eastern states in the winter, the protection of fruits and vegetables in transit is a real problem. While a number of factors enter into the question of freezing protection in transit, the principal one is insulation. Aside from condition and quantity of insulation, shippers and carriers have both attempted to minimize the danger from freezing by heavy tight loading and lining the inside with heavy paper, sometimes using several thicknesses, by putting in floor-racks and by placing stoves in the bunkers or in the middle of the car.

Both tight and heavy loading are desirable when there is danger from freezing. The tight load tends to hold the heat more effectively and the heavier the load the more heat there is to draw on. Lining with heavy building-paper, or other paper of similar character, gives added protection. Certain roads have found floor-racks of decided value in minimizing the damage from freezing. Results both experimentally and commercially fully justify their use to minimize frost damage as well as an aid to more effective refrigeration. The use of stoves or heaters is hardly to be commended, as frequently the injuries from overheating certain parts of the car result in deterioration as regards quality, condition, and appearance that exceed what the freezing damage would have been. In the transportation of potatoes during the colder months from northern states such as Maine, heater cars are used to a considerable extent. Ordinary freight cars with specially constructed bins so as to provide an air-space between floor and sides of car and the load are used very largely also. A stove is placed in the middle of the car and a messenger accompanies three, four, or more cars to keep the fires going properly. The heat from heaters either outside or inside the cars is depended on more than the insulation to maintain temperatures above freezing.

H. J. Ramsey.

TRÀPA (abbreviated from *calcitrapa*, which is the same as caltrops, an instrument of war used to impede the progress of mounted warriors; it had four spine-like projections, like the fruit of the water caltrops). *Trapàceæ* or *Hydrocarydàceæ;* by some retained in *Onagràceæ*. Floating plants adapted to the aquarium.

Flowers small, axillary, solitary, short-peduncled; calyx 4-parted, the segms. persistent, sometimes spinescent; petals and stamens 4; ovary 2-loculed; ovules solitary, long, pendulous, affixed to the septum: fr. top-shaped, leathery or somewhat bony, 1-loculed, 1-seeded.—Three species, native to the warmer parts of the eastern hemisphere.

Trapa natans is one of the daintiest aquatics in cultivation. It is perfectly hardy and very desirable for aquaria, pools, ponds, or tub-culture. Its beautifully mottled or variegated foliage is very attractive. The flowers are white, small, and inconspicuous. The fruits are very large in comparison with the flowers and leaves, but they are hidden beneath the foliage until they ripen, when they drop off. They are good to eat raw, like chestnuts, and are sweeter and more palatable before the shell becomes hard. The nut is not likely to become of commercial importance in America. The seeds drop from the plant and remain in the pond all winter. Seeds must be kept in water or moist to retain their vitality. (William Tricker.)

nàtans, Linn. Water Chestnut. Water Caltrops. Jesuit's-Nut. Petiole of floating lvs. 2–4 in. long, nearly glabrous; blade rhombic-orbicular, dentate in upper half, slightly villous along the nerves beneath: fr. 4-spined, but the 2 lateral ones shorter. Eu., Orient. Gn. 24, p. 557. G.C. II. 10:213. B.R. 259.—It has two kinds of lvs. The submerged ones are root-like, long, slender, and feathery. The floating lvs. form a loose rosette. The lf.-stalks are swollen and spongy near the apex. The fr. is an inch or two across and has 4 spinescent angles. It is roasted and eaten in some parts of Eu. like the common chestnut. It is sparingly

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naturalized in this country. Var. *verbanénsis*, Cesati (*T. verbanénsis*, De Not.), of Lake Maggiore in Italy, has deltoid lvs. and compressed 3-angled fr. with 2 short horns.

bispinòsa, Roxbg. SINGHARA-NUT. Petiole of floating lvs. 4–6 in. long, woolly; blade 2 x 3 in., slightly crenate in the upper half, very villous beneath: fr. ¾in. thick, with 2 of the spines sometimes absent. India, Ceylon.—Said to yield very large and sweet nuts which are sold under the name of Singhara-nut; much used by natives.

T. bicórnis, Linn. f., the Ling of China, is by some referred to T. natans: the fr. has 2 strong opposite long decurved horns like those of a bull's head.

WILHELM MILLER.

TRAUTVETTÈRIA (E. R. von Trautvetter, a Russian botanist). *Ranunculàceæ*. Tall erect perennial herbs grown somewhat for their broad leaves and small white flowers borne in clusters.

Leaves broad, palmately lobed: fls. white, small, corymbose-paniculate; sepals 3–5, caducous; petals none: carpels many, forming 1-seeded achenes.—Two species, N. Amer. and E. Asia. Very hardy, thriving in ordinary or rich soil. Easily prop. by division of roots either in late fall or early spring. There is not likely to be much difficulty associated with this operation. Offered by dealers in native plants.

carolinénsis, Vail (*Hydrástis carolinénsis*, Walt. *T. palmàta*, Fisch. & Mey.). Sts. 2–3 ft. high: lvs. alternate, reticulated, radical ones very large, with lobes much toothed and cut. July. Pa., south and west. B.M. 1630 (as *Cimicifuga palmata*). G. 29:395.

grándis, Nutt. (*T. palmàta* var. *occidentàlis*, Gray. *Actæa grándis*, Dietr.). Much like the above species: lvs. membranaceous, more deeply lobed, often to the base, thin, sparsely hairy beneath along the ribs; reticulations less distinct: styles longer and somewhat curled. Wash., Idaho, Brit. Col.

The genus Trautvetteria is variously interpreted. Many authors regard it as monotypic, the Japanese form (*T. japonica*, Sieb. & Zucc.) being included in one cosmopolitan species (T. carolinensis). E. L. Greene, on the other hand, described 6 new American species at one time in 1912: *T. nervata*, from Ga.; *T. fimbriata*, from Ore.; *T. applanata*, Mo.; *T. rotundata*, Calif.; *T. saniculifolia*, Idaho; and *T. media* from New Mex.

K. C. DAVIS.

TRAVELER'S TREE: *Ravenala.*

TREE OF HEAVEN: *Ailanthus.*

TREES: *Arboriculture.*

TREE SURGERY: *Arboriculture*, Vol. I, page 354.

TREFOIL: *Clover*, *Trifolium*; sometimes applied to *Lotus*, *Desmodium* (tick trefoil), and other Leguminosæ.

TRÈMA (Greek, *trema*, hole, alluding to the pitted stone). *Ulmàceæ*. A group of about 30 species of evergreen trees or shrubs in the tropical and subtropical regions of the Old and New Worlds: lvs. alternate, short-petioled, serrate, 3-nerved or penninerved, stipulate: fls. small, in nearly sessile clusters, monœcious or diœcious, apetalous, 5- or rarely 4-merous; sepals of staminate fls. valvate below, imbricate above; stamens 4–5; ovary 1-celled, superior style with 2 linear arms: fr. a small ovoid or subglobose drupe; embryo curved or involute. Adapted for cult. in tropical and subtropical regions only and sometimes planted for its evergreen foliage. The first of the two species described below has been offered in Calif., the second in Fla.

bracteolàta, Blume. Small tree, to 30 ft.: lvs. ovate-oblong to ovate-lanceolate, acute, rounded at the base, crenate-serrate, pubescent on both sides, more densely beneath, 3-nerved at the base, 2–4 in. long: fls. in small axillary clusters: fr. globose, black, ⅛in. long, crowned by the remnants of the styles. S. Afr. Wood, Natal Pl. 4:356.—It is said in Calif. that in deep soil it makes a much-branched bushy tree with foliage similar to mulberries, and remarkable for the bright orange color of the old lvs. before dropping down.

orientàlis, Blume (*Céltis orientàlis*, Linn.). Small tree; branchlets pubescent: lvs. rigid, ovate-oblong to ovate-lanceolate, acuminate, cordate and 3–7-nerved at the base, crenate-serrulate, scabrid above, clothed with silvery, appressed pubescence beneath, 3–6 in. long: fr. ovoid, ⅛in. long, black. S. Asia. Wight, Icon. 1971.—A plant offered under this name seen by the writer proved to be a true Celtis, not a Trema.

ALFRED REHDER.

TREMÁNDRA (Greek, *hole* and *anther;* the anthers burst open through a hole). *Tremandràceæ*. More or less stellate-tomentose shrubs, sometimes grown in the greenhouse. Lvs. opposite, ovate, dentate: fls. in 5's; petals not inclosing the stamens, which are rather in 1 row, dehiscing by a single somewhat 2-valved pore; disk glandular, crenate, almost 5-lobed: caps. loculicidally 2-valved.—Two species, Austral. *T. stelligera*, R. Br. Densely stellate-hairy, 2 ft. or more high: lvs. short-petioled, ovate, obtuse, 1–1½ in. long, coarsely and irregularly toothed: fls. on pedicels shorter than the lvs.; sepals villous or tomentose. Austral. Rarely cult.

A plant is mentioned as in cult. under the name of *T. ericoides hirsùta*, Bedingh., but there seems to be some confusion and also doubt as to what it is. The plant in question has brown sts., small, subulate, heath-like lvs. and bright purplish pink drooping blossoms borne on rather long slender pink pedicels. Extra.-Trop. Austral. R.B. 25:133.

TREVÈSIA (after the family Treves di Bonfigli of Padua, patrons of botany). *Araliàceæ*. Showy and rather striking small trees or shrubs from Trop. Asia and the islands in that region: lvs. either palmately cut and simple, or digitately or pinnate compound: fls. rather large for the family and borne in panicled umbels; petals 8–12, valvate, somewhat thick; stamens 8–12; ovary 8–12-loculed: fr. large, ovoid.—About 9 species. Should be grown in a warm moist house, as the plants naturally grow in damp jungles.

palmàta, Vis. (*Gastònia palmàta*, Roxbg.). A small tree frequently 20 ft. in cult., with the ends of the branches sparingly prickly and the young parts tomentose: lvs. crowded at the ends of the branches, 1–1½ ft. across, palmately 5–9-lobed to below the middle; petioles 1–1½ ft. long: panicles long-peduncled, erect: umbels 6 in. through, long-stalked: fls. 1 in. across, yellowish white, showy. Himalayas. B.M. 7008.

T. Sánderi, Hort. Lvs. handsome, deeply cut, borne on long cylindrical petioles; lf.-blade nearly circular in outline, 2 ft. across, digitate, the divisions irregularly pinnatifid and joined at the base. Perhaps a form of what is known in cult. as T. Sundaica. Annam. G.C. III. 53:295.—*T. sunddica*, Regel, is apparently a form of T. palmata; *T. sunddica*, Miq., is a distinct species from Java and Sumatra, with infl. becoming recurved. See Gilibertia.

N. TAYLOR.†

TREVIRÀNA: A section of *Achimenes.*

TREVÒRIA (named for Sir Trevor Lawrence). *Orchidàceæ*. Epiphytic orchids, grown in the warmhouse.

Pseudobulbs elongated-pyriform, not compressed, 1-lvd.: lvs. large, rather leathery, folded, contracted to the petiole: scapes arising from the base of the pseudobulbs, simple, bearing a lax few-fld. raceme: fls large, fleshy, pedicelled; sepals rather thick, free-spreading, lateral ones oblique, very large; petals fleshy, twisted, conspicuously narrower than the sepals; labellum fleshy, concave, erect, not movably jointed with the base of the column, lateral lobes erect, axe-shaped, laxly surrounding the column; midlobe linear-hastate; column rather long, terete, clavate or abruptly truncate at apex; rostellum 2-toothed, membranaceous; pollinia 2: caps. fusiform.—About 3 species, Trop. Amer.

Chlòris, Lehm. Laxly cespitose: pseudobulbs long-pyriform: lf. oblong-lanceolate, acuminate, long-

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petioled: spike pendulous, few-fld., commonly 3: fls. fleshy, greenish; dorsal sepals, oblong-lanceolate, acuminate, revolute, lateral ovate, obliquely acuminate; petals ligulate-falcate, cuspidate; lip with the lateral lobes axe-shaped and the midlobe linear-hastate. Colombia. G.C. III. 21, suppl. May 29.

Lèhmannii, Rolfe. Pseudobulbs fascicled, cylindrical or elongate-pyriform, 1-lvd., not ribbed, covered by brown lanceolate sheaths below the middle: lfts. subsessile, oblong-lanceolate, plicate: spike pendulous, few-fld., rachis stout: fls. up to 2½ in. across, green; sepals broad-ovate, subacute, concave, fleshy; petals much narrower than the sepals, oblong-lanceolate, spreading-recurved, paler; lip fleshy, lateral lobes ear-shaped, erect, midlobe 5-grooved, stipitate, swollen, 2-callused. Colombia. B.M. 7805 (as *T. Chloris*).

F. Tracy Hubbard.

TRÈWIA (from C. J. Trew, a German physician, 1695–1769). Also spelled *Trèvia*. *Euphorbiàceæ*. Small tropical softwood trees rarely cult. in greenhouses, but little known to gardeners and apparently not in the American trade: branching from the base: lvs. opposite, entire, 3–5-nerved: fls. dicecious, in lateral racemes or the pistillate singly, apetalous; stamens simple, 50 or more; styles free above the base. About 5 species, mostly in Trop. Asia. Related to Mallotus. *T. nudiflòra*, Linn., with broadly ovate, acute or acuminate, cordate to subcuneate lvs., has been in cult. in Eu. from S. Asia. It is prop. by cuttings in sand.

J. B. S. Norton.

TRIÀNEA: *Limnobium.*

TRIBRÒMA: *Theobroma*, p. 3331.

TRICALÝSIA (Greek, *triple calyx;* true of some species). Including *Kraùssia*. *Rubiàceæ*. Erect or climbing shrubs, used as ornamentals in extreme South.

Branches opposite, terete or obtusely quadrangular: lvs. opposite, short-petioled; stipules short, broad, apiculate and intra-petiolar: fls. rather small, subsessile, shortly pedicelled, axillary; calyx-tube turbinate or campanulate, 4–6-lobed or shortly dentate; corolla funnel-shaped or shortly salver-shaped, lobes 4–8, oval, ovate, or lanceolate; stamens 4–8; disk annular, fleshy, glabrous; ovary 2- rarely 3-celled: fr. pisiform, berry-like, leathery, 1–2-celled, few-seeded.—About 65 species, Trop. and S. Afr., Madagascar; two intro. in Fla. and S. Calif.

A. *Lvs. lanceolate, acuminate.*

lanceolàta, Hiern (*Kraùssia lanceolàta*, Sond.). Shrub: lvs. lanceolate, acuminate: cymes many-fld.: calyx 5-toothed; throat of corolla densely bearded; stigma deeply 2-lobed, lobes revolute: fr. globose, the size of a pea. Natal.

AA. *Lvs. elliptic, obtuse.*

Sonderiàna, Hiern (*Kraùssia coriàcea*, Sond.). Shrub: lvs. elliptical, obtuse or minutely apiculate, wedge-shaped at the base, coriaceous, 1½–3½ in. long: cymes about 4-fld.: fls. pentamerous; pedicels ⅓–⅝in. long; throat densely bearded; stigmas deeply 2-lobed, lobes revolute. Natal.

T. Kraussiàna, Schinz (Coffea Kraussiana, Hochst. Kraùssia floribunda, Harv.). Shrub with reddish brown branches: lvs. ovate-oblong or lanceolate-subacute: cymes axillary, paniculate: corolla 3–4 lines long. Natal.

F. Tracy Hubbard.†

TRICHÍLIA (Greek, *by threes;* the fls. are trimerous). *Meliàceæ*. Trees or shrubs, suitable for the warmhouse or outdoors in the extreme S. as ornamentals. Lvs. with 3 lfts. or uneven-pinnate; lfts. opposite or alternate, usually many-paired, rarely 2-paired: panicles many-fld., axillary: fls. large for the order; calyx short, 4–5-toothed or cleft; petals 4–5, erect or spreading; staminal tube 8–10-cleft or -parted; disk annular, free; ovary sunken in the disk, 2–3-celled: caps subglobose, leathery, 2–3-celled.—About 120 species, Trop. Amer. and Trop. Afr.

spondioìdes, Jacq. Tree, 15–20 ft. high: lvs. pinnately compound; lfts. 7–10-paired, ovate-oblong, oblique and round at base, glabrous: panicles puberulent, divisions 3–11-fld.: fls. greenish yellow; staminal tube cohering one-third its length, anthers 10, hairy: caps. tomentose, rugulose, 5–6 lines diam. Trop. Amer. and intro. into S. Fla.

T. undulatifòlia, Hort., is offered in the foreign trade.

F. Tracy Hubbard.

TRICHÍNIUM (Greek, *hairy*, alluding either to the plant in general or to the fl.-heads). *Amarantàceæ*. Herbs, subshrubs or rarely shrubs glabrous or pubescent, adapted to greenhouse cult.: lvs. alternate, narrow, rarely obovate or spatulate, entire: fls. in dense spikes or globose or oblong heads, white, straw-colored or rose, hermaphrodite; perianth narrow or elongate, 5-parted, segms. equal, linear, rigid, usually plumose; stamens 5; ovary sessile or stipitate, glabrous or lanuginous, ovule 1: fr. an indehiscent utricle.—About 60 species, natives of Austral.

exaltàtum, Benth. (*Ptilòtus exaltàtus*, Nees). A tender perennial, 2–3 ft. high, erect, usually branching above: lower lvs. 2–5 in. long, oblong-lanceolate, rather thick, contracted into a long petiole; upper lvs. smaller: spikes erect, long-peduncled, at first ovoid-conical, becoming longer: perianth ¾in. or less long, yellowish, with dull red tips. B.R. 25:28 (as *T. alopecuroideum*).—Intro. in this country as a greenhouse subject.

T. Mànglesii, Lindl., is perhaps the choicest species. It has violet-purple fls. in large pyramidal heads 3 in. long and 2 in. wide at base. It could probably be grown as a summer annual. B.M. 5448. F.S. 23:2396. R.H. 1866:291. F. 1864:217. I.H. 13:464. G.C. 1864: 555; III. 32:181. G. 25:20. Gn. 68, p. 225.

F. W. Barclay.

TRICHLÒRIS (Greek, for *three*, and *Chloris*, a genus of grasses, referring to the 3 awns which differentiate the two genera). *Gramìneæ*. Perennial grasses that resemble Chloris but differ in having 3-awned lemmas. Species 5, Mex. and S. S. Amer.

mendocìna, Kurtz. (*T. Blanchardiàna*, Hack.). Spikes several, erect, slender, approximate at top of the culms, feathery with the delicate awns. Argentina.—An ornamental grass, readily grown from seed.

A. S. Hitchcock.

TRICHOCAÙLON (Greek, *hair* and *stem;* said to allude to the bristles that tip each tubercle on the st.). *Asclepiadàceæ*. Perennial herbs, suitable probably for the warmhouse. Sts. low, thick, fleshy, many-angled, angles tuberculate; tubercles aculeate: fls. small, between the angles, usually solitary, very short-pedicelled; calyx 5-parted, segms. acute; corolla disk-shaped, deeply 5-cleft, lobes broadly ovate; disk double, short-stipitate, outer deeply 5-lobed, inner 5 ligulate lobes.—About 15 species, Trop. and S. Afr. *T. pìctum*, N. E. Br. St. subglobose or cylindrical, oblong, very obtuse, 2–3 by about 2 in., irregularly tessellate-tuberculate, glabrous: fls. fascicled, erect, fascicles 2–4-fld.; sepals broad ovate; corolla not ½in. diam., white marked with purple spots and numerous short lines, lobes broad deltoid-ovate, acute. S. Afr. B.M. 8579. *T. Pillaùsii*, N. E. Br. Plant 5–9 in. high, branching at base: sts. 1¼–2¼ in. diam., cylindrical, with many tuberculate angles, glaucous-green, glabrous, tubercles ending in stiff bristles: fls. in small clusters, between the angles, toward the top of the sts.; sepals ovate, very acuminate; corolla bright creamy yellow, glabrous and smooth outside, densely papillate on the inner face of lobes. S. Afr. Var. *major*, N. E. Br. Plant and fls. larger than the type. S. Afr.

F. Tracy Hubbard.

TRICHOCÉNTRUM (Greek, *hair* and *spur*, alluding to the long slender spur). *Orchidàceæ*. A small group allied to Rodriguezia (Burlingtonia); the plants grow in dense matted tufts.

Pseudobulbs very small, each bearing a broad fleshy

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lf.: infl. a few-fld. raceme on which usually only 1 fl. opens at a time: sepals and petals free, spreading; labellum larger, spurred, with 2 lateral lobes and a 2-parted middle lobe; column short; pollinia 2, on a wedge-shaped stipe.—About 20 species. Epiphytes of dwarf stature, growing best on blocks; free-flowering; they suffer from too much water at the root; give them a warmhouse temperature. Prop. by division.

álbo-purpùreum, Reichb. f. Lvs. oblong-lanceolate, 3 in. long, tufted: fls. on short peduncles, 2 in. across; sepals and petals obovate-lanceolate, inside maroon-brown, with greenish tips, outside greenish; labellum subquadrate, white, with a large purple spot on each of the lateral lobes. Brazil. B.M. 5688. A.F. 6:609. J.H. III. 51:382.

tigrìnum, Lindl. & Reichb. f. Similar in habit to the preceding: lvs. oblong, obtuse, speckled with red: fls. pendulous, nearly 3 in. across; sepals and petals broadly linear, yellow, speckled with red; labellum cuneate-obovate, emarginate, white, rose toward the disk. May. Cent. Amer. B.M. 7380. I.H. 24:282.

T. panaménse, Rolfe. Fls. light green, with white lip, with red-purple blotch at base; spur yellowish, short, dilated, divided at apex into 4 short lobes. Panama.

HEINRICH HASSELBRING.

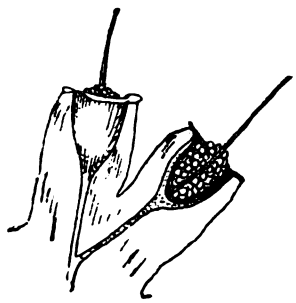
TRICHOGLÓTTIS (Greek, *hair* and *tongue*, referring to the fine hairs on the labellum). *Orchidàceæ.* Epiphytic herbs, occasionally grown in the warmhouse. Sts. leafy, elongated, not pseudobulbous: lvs. distichously arranged along the st., narrow: peduncles lateral, very short, 1- to few-fld.: fls. small or medium; sepals spreading, lateral very broad at the base, dorsal oblong; petals like the dorsal sepal; lip adnate with the column-foot, forming a long horizontal spur-like chin, spreading above, lateral lobes erect, short, midlobe rather broad, spreading; column short, wingless; pollinia 2, globose.—About 30 species, Malaya and the Philippines. *T. Solerèderi,* Kränzl. Sts. elongated: lvs. fleshy, somewhat lanceolate, up to 5 in. long, about 1 in. wide: racemes 1-fld.: sepals obovate-oblong, 4–5 lines long, bright green, each with 5 transverse brown-purple bands; petals much smaller, similar in color, but with only 3 bands; lip ½in. long, white, soon becoming yellowish with 2 blood-red spots on the disk. Philippines. *T. Dawsoniàna,* Reichb. f. (*Cleisóstoma Dawsoniàna,* Reichb. f.). Scape 6–10 in. high, stout: lvs. 3–8 in. long, oblanceolate: fls. 2 in. diam., yellow-green barred with brown; sepals oblong-lanceolate; petals shorter; lip subsessile, side lobes oblong, midlobe ovate, acute, with a short falcate wing on each side of the tip. Burma.

3836. Tricholæna rosea.

F. TRACY HUBBARD.

TRICHOLÆNA (Greek for *hair* and *mantle*, referring to the covering of silky hairs on the spikelets). *Gramíneæ.* Allied to Panicum: spikelets loosely paniculate, clothed with long silky hairs; first glume minute, remote from the second; second glume and sterile lemma 2-lobed, a slender awn from between the lobes.—Species 10, all African, 1 extending to the Medit. region and 2 to India.

rósea, Nees (*T. violàcea,* Hort. *T. grandiflòra,* Hochst. *Pánicum tónsum,* Steud.). Fig. 3836. NATAL-GRASS. Annual: culms usually geniculate at base, 1½–3 ft. high: panicle 3–8 in. long, the silky spikelets a rich wine-color when fresh, changing to purplish when dry. S. Afr. R.H. 1897, p. 273.—One of our most beautiful ornamental grasses. Sometimes called ruby-grass. It has become naturalized in parts of Fla. and Calif. A. S. HITCHCOCK.



3837. Fructification of Trichomanes. (Enlarged.)

TRICHÓLEPIS (Greek, *hair* and *scale*, the involucral scales are narrow with long hair-like tips). *Compósitæ.* Annual or perennial herbs, which are branched and unarmed: lvs. alternate, entire, toothed or the lower pinnatifid: heads terminal, solitary, homogamous; involucre ovoid or broader; bracts many-rowed, very narrow, usually with long recurved hair-points: fls. all hermaphrodite, similar and fertile, yellow, red, or purple; tube slender; limb 5-cleft: achenes glabrous, oblong or obovoid, ribbed.—About 7 species, India.

furcàta, DC. Glabrous or puberulous herb, 1½–6 ft. high, branched from the base: lvs. 2–6 x ¾–2½ in., elliptic-lanceolate, acute or acuminate, denticulate, short-petioled: head rather large, yellow; involucral bracts needle-like. Himalaya. Grown for ornament.

TRICHÓMANES (Greek, *soft hair*). *Hymenophyllàceæ.* A group of filmy ferns distinguished by its tubular cup-like indusium and filiform elongate receptacle. (Fig. 3837.) Very delicate in texture and capable of being grown successfully only under shaded glass. Over 100 species are known. Various species may be found in the collections of fanciers, but the following appear to be the only ones regularly in the American trade. For culture, see *Ferns.*

radìcans, Swartz. Lvs. 2–8 in. long, 1–1½ in. wide, bipinnatifid; pinnæ ovate, obtuse; indusia terminal, on short lobes. Tropical regions, extending into the southern states as far as Ky.

Prieùrii, Kunze (*T. ánceps,* Hook.). Lvs. 12–18 in. long, 6–12 in. wide, tri-quadripinnatifid; pinnæ ovate-lanceolate; sori 2–12 to a pinnule, small, in sinuses; indusium with a much dilated lip. Trop. Amer.

L. M. UNDERWOOD.

TRICHONÈMA: *Romulea.*

TRICHOPÌLIA (Greek, *hair* and *cap;* the anther is concealed under a cap surmounted by three tufts of hair). *Orchidàceæ.* Handsome orchids, usually grown in pots, although epiphytal.

Pseudobulbs crowded on the short rhizome, flattened and often elongate, 1-lvd., surrounded with dry scales at the base: lvs. large, solitary, erect, fleshy, keeled: fls. abundantly produced on short, nodding or decumbent scapes; sepals and petals narrow, spreading, often twisted; labellum large, forming the most conspicuous part of the fl., united with the column below, lateral lobes convolute, middle lobe spreading; anther bent over; pollinia on a triangular caudicle; clinandrum fimbriately winged.—About 20 species, ranging from Mex. to S. Amer. The fls. keep fresh a long time, both on the plant and when cut. They need an intermediate or greenhouse temperature. If grown too warm, they suffer. Prop. by division.

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Galeottiàna, A. Rich. & Gal. Pseudobulbs narrow, flattened, 5 in. long: lvs. oblong, acute, about 6 in. long: scapes short, mostly 1-fld.: sepals and petals cuneate-lanceolate, yellowish green, sometimes with a band of cinnamon down the middle; labellum trumpet-shaped, whitish with some purple streaks and dots in the center, and yellow in the throat. Aug., Sept. Costa Rica, Mex. I.H. 6:225 (as *T. picta*). B.M. 5550 (as *T. Turialvæ*). C.O. 5.

frágrans, Reichb. f. (*Pilúmna frágrans*, Lindl. *T. Backhousiàna*, Reichb. f.). Pseudobulbs clustered, flattened, 3–5 in. long, 1-lvd.: lvs. oblong-lanceolate, acute, 6–8 in. long: scape pendent, 1 ft. long, about 6-fld.: fls. on pedicels 3 in. long; sepals and petals spreading, linear-lanceolate, 2½–3 in. long, wavy and twisted, greenish white; labellum folded over the column, spreading in front, and somewhat lobed, white with a yellow stain in the throat. Summer. Colombia. B.M. 5035. C.O. 3. G. 35:411. G.M. 52:421.—Fls. almond-scented.

nóbilis, Reichb. f. (*Pilúmna nóbilis*, Reichb. f. *T. cándida*, Lind.). Pseudobulbs large: lvs. broadly oblong-acute: fls. white; sepals and petals linear-oblong, acute, 2 in. long, scarcely twisted; labellum large, white with a yellow spot in the throat. Venezuela. I.H. **19**:94 (as *T. fragrans* var. *nobilis*). F.M. 1872:21 (as *T. fragrans*). —This has larger stouter pseudobulbs and shorter broader lvs. than *T. fragrans*. The labellum is larger and the petals shorter compared with the size of the fl. Var. **álba,** Hort., has fls. pure white.

tórtilis, Lindl. Pseudobulbs oblong, compressed, somewhat curved, 2–4 in. long: lvs. solitary, oblong, acute, 6 in. long: fls. solitary, on decumbent stalks shorter than the lvs.; sepals and petals linear-lanceolate, 2 in. long, spirally twisted, brown with yellowish margins; labellum forming a tube around the column, upper portion expanded, 4-lobed, white with crimson spots, becoming entirely crimson within. Fls. profusely in summer and sometimes again in winter. Mex. B.M. 3739. B.R. 1863. F.C. 3:101. B. 3:122. C.O. 6. Var. **álba,** Hort., is advertised.

suàvis, Lindl. Fig. 3838. Pseudobulbs thin, compressed, 2 in. long: lvs. broadly oblong, 8 in. long: scape pendent, about 3-fld.: fls. on long, curved stalks, large; sepals and petals lanceolate-acuminate, wavy, nearly straight, 2 in. long, white or cream-colored; labellum large, projecting forward, white or cream-colored, spotted with pale purple, yellow in the throat; limb large-lobed, wavy, and crenate. May, June. Cent. Amer. B.M. 4654. F.S. 8:761. R.H. 1859, pp. 220, 221; 1887, p. 454. Gn. 4, p. 511; 31, p. 452; 38, p. 185; 48, p. 79; 51, p. 371. C.O. 4. R.B. 23:256. G.M. 38: 281. A.G. 24:331. J.F. 3:277. J.H. III. 43:371. Var. **álba,** Warner. Fls. white with a yellow spot in the throat of the labellum. C.O. 4*a*. G. 16:686. G.W. 14, p. 52. Var. **grandiflòra,** Hort. A large-fld. form. G.W. 5, p. 344. Var. **cándida,** Hort. Fls. pure white except yellow blotch at base of lip.

marginàta, Henfr. (*T. coccínea*, Warsc. *T. crispa* var. *marginàta*, Hort.). Pseudobulbs clustered, oblong, compressed: lvs. broadly lanceolate, suddenly acuminate, subauriculate at the base: scape about 3-fld.: fls. large, whitish outside, reddish purple within; sepals and petals linear-lanceolate, margined with white, the former slightly twisted; labellum trumpet-shaped, with a large, rounded, wavy, 4-lobed blade. May, June. Cent. Amer. B.M. 4857. F.S. 14:1490; 18:1925–26. G.C. III. 20:456. F.M. 1874:98 (as *T. lepida*). J.F. 2:184. C.O. 2.

crispa, Lindl. This plant was described by Lindley in Linden's catalogue. It is closely related to *T. marginata*, which is sometimes classed as a variety of *T. crispa*. The following description is taken from Watson's Orchids: Pseudobulbs ovate, flattened, 2–3 in. long, dark green, 1-lvd.: lvs. leathery, 6 x 2 in., keeled, acute-pointed: fl.-spikes basal, drooping, short, 3-fld.: fls. with pedicels 2 in. long; sepals and petals spreading. 2½ in. long, ½in. wide, wavy-edged, twisted, brownish yellow; lip folded over the column, spreading in front, 1½ in. across, colored deep crimson with a white margin. May, June. Costa Rica. C.O. 2.

T. Goùldii=T. suavis×T. fragrans.—*T. Henniziàna*, Kränzl. Fls. very fragrant, pure white, with 2 zones of golden yellow on lip. Colombia.

HEINRICH HASSELBRING.

TRICHÓPTERIS (from Greek for *hair*, and *Pteris*). *Cyatheàceæ*. A generic name applied to several American species of Alsophila which, however, probably do not deserve separation. *T. Albertii*, Hort., said to come from the Congo, is not botanically known.

R. C. BENEDICT.

TRICHOSÁNTHES (Greek, *hair* and *flower*, alluding to the fringed edge of the petals). *Cucurbitàceæ*. SNAKE GOURD. Climbing herbs, annual or perennial, sometimes shrubby at base, roots sometimes tuberous, grown both in the greenhouse and outdoors as tender annuals.

Leaves entire or 3–5-lobed, base cordate; tendrils simple or 2–3-cleft: fls. rather large or small, white, monœcious; male fls. racemose, calyx-tube oblong or

3838. Trichopilia suavis. (×¼)

cylindrical, dilated above, 5-lobed, corolla rotate, 5-parted; stamens 3, ovary rudimentary; female fls., calyx and corolla as in male, stamens rudimentary or none; ovary oblong or globose: fr. usually large, fleshy, globose, oblong, ovoid-fusiform, or conical.—About 50 species, Trop. Asia, N. Austral, and Polynesia. Monographed in DC. Monogr. Phaner. 3:351. The fr. is often ornamental and highly colored; in *T. Anguina* it has been noted over 6 ft. in length. The plants flower in July from seed sown in March. They may be treated as tender annuals.

A. *Bracts small or none on the racemes of male fls.*

B. *Fr. ovoid.*

cucumeroìdes, Maxim. Root fleshy, tuberous: st. slender, 12–15 ft.: lvs. ovate in outline, 4–6 in. long, more or less palmately 3–5-lobed, margin crenulate: peduncle bearing the male fls. 1–4 in. long and 3–15-fld.:

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petals about ½in. long, oblong, acute, longly fringed: fr. oblong, shortly rostrate, nearly 3 in. long, vermilion-colored. Japan.—Offered by importers of Japanese plants.

BB. *Fr. oblong.*

Anguìna, Linn. (*T. colubrìna,* Jacq.). SERPENT or SNAKE GOURD. Fig. 3839. St. slender, tall-growing: lvs. nearly circular in outline, 5–7 in. across, 3–7-lobed; lobes round; margin undulate or wavy: peduncle bearing the male fls. 4–10 in. long, 8–15-fld.: body of petals oblong, less than ½in. long, fringes ½in. long: fr. slender, contorted, often exceeding 3 ft. in length. India, but widely planted. B.M. 722. B.R. 32:18. R.H. 1859, p. 595.

3839. Trichosanthes Anguina. (×⅛)

AA. *Bracts large on the male raceme.*

B. *Calyx-segms. entire.*

C. *Lvs. lobed.*

Kirilòwii, Maxim. (*Eopèpon vitifòlius,* Naud.). Perennial root tuber-like: st. annual, high-climbing, 20–30 ft.: lvs. nearly circular in outline, 3–8 in. across, deeply 5–7-lobed, the lobes oblong, acute, coarsely serrate: racemes bearing the male fls. 4–8 in. long, 3–8-, rarely only 1-fld.: petals triangular-wedge-shaped, deeply cut and the segms. much cut and longly fimbriate, ovoid, somewhat acute; base shortly attenuate, yellowish orange, about 4 in. long, 2½ in. thick. Mongolia.

CC. *Lvs. not lobed.*

cordàta, Roxbg. (*T. palmàta,* Wall.). Root tuberous: st. robust, high-climbing: lvs. wide, ovate-cordate, acute or shortly acuminate, 5–8 in. long, rarely somewhat angled or obscurely lobed; margin slightly dentate: peduncle bearing male fls. 5–8 in. long, 4–8-fld.: calyx-segms. finely acute: fr. globose, red, orange-streaked, not acute at the apex. India.

BB. *Calyx-segms. toothed.*

bracteàta, Voigt (*T. palmàta,* Roxbg.). St. stout, climbing to 30 ft.: lvs. broadly ovate, scabrous above, usually deeply 3–7-lobed; lobes acute; margin dentate: peduncle of male fls. 4–8 in. long, 5–10-fld.: fr. globose, red with orange stripes about 2 in. long. India.

F. W. BARCLAY. F. TRACY HUBBARD.†

TRICHÒSMA (Greek, *three* and *ridge,* referring to the 3-lobed labellum). *Orchidàceæ.* A genus of 1 species resembling Cœlogyne. Sepals and petals similar, erect-spreading, the lateral pair forming a distinct mentum with the projecting foot of the column; labellum 3-lobed, the lateral lobes erect, convolute over the column, middle lobe with longitudinal ridges: sts. slender, 2-lvd.: infl. racemose. *T. álbo-marginàta* of the trade is unidentified.

suàvis, Lindl. (*Éria coronària,* Reichb. f.). Lvs. lanceolate, undulate, 3-nerved: fls. few in a terminal raceme, white, yellowish or purplish, fragrant; sepals ovate-lanceolate; petals oblong; labellum ovate-oblong, streaked with purple; disk yellow, middle lobe with several crenate ridges. Himalaya. B.R. 28:21.

HEINRICH HASSELBRING.

TRICHÓSPORUM (Greek, *hair* and *seed;* seeds with 1 or more long hairs at the ends). Syn., *Æschynánthus. Gesneriàceæ.* Subshrubs or shrubs, often climbing over trees, glabrous or rather villous, grown in the warmhouse.

Lvs. opposite, fleshy or leathery: fls. showy, scarlet, greenish or yellow and green mixed, fascicled in the axils or at the ends of the branches, rarely solitary; calyx truncate, 5-cleft or 5-parted; corolla-tube elongated, ventricose or broadened above; limb somewhat 2-lipped, usually strongly oblique; perfect stamens 4; disk annular, usually thick, cup-shaped; ovary superior, oblong or linear: caps. long-linear, 2-valved.—About 55 species, India, Malaya, and E. Trop. Asia.

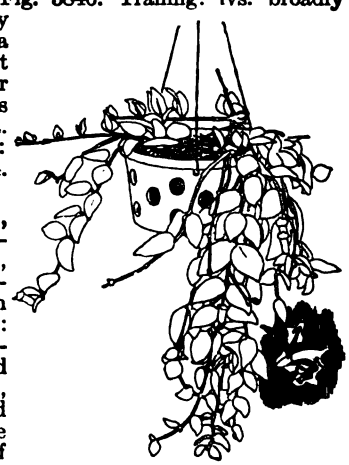
These beautiful free-flowering plants are propagated by cutting the branches that have been made during the season of growth into lengths of about 2 inches, having two leaves attached and another joint to insert in the sand. They root in about a month in a close frame when the temperature top and bottom is maintained around 70°. Being epiphytal under natural conditions, these plants like a loose open material to grow in, and equal parts of osmunda fiber and sphagnum moss to which plenty of broken charcoal has been added are the best potting material. Shallow pans are best to grow them in, and provision should be made for the water to pass freely through them. The plants should not be allowed to flower the first season, the aim being to secure a good foundation for a future plant, and this is done by pinching the shoots three or four times during the season, growing them in a night temperature of 65°. In winter they may be kept 5° cooler and given enough water to prevent shriveling. The plants should not be stopped the second season, but allowed to run to flower; but after they have finished flowering they may be pruned back to within 6 inches of the base of the plant. Trichosporums should be grown hung from the roof of the house, near the glass, and when the sun gets strong they should have a light shade. When well rooted in the pan they are growing in, manure-water should be given. These plants are not subject to insect pests. (George F. Stewart.)

A. *Calyx deeply 5-parted, the lobes acute.*

grandiflòrum, D. Don (*Æschynánthus grandiflòra,* Spreng.). St. creeping, mostly herbaceous, 4–5 ft.: lvs. lanceolate, acuminate, 4–5 in. long, repand-serrate, fleshy: fls. aggregated; calyx fleshy and short; corolla arched-tubular, 2–3 in. long, downy, orange-scarlet. E. India. B.M. 3843. P.M. 5:241.—Will succeed in an intermediate house.

AA. *Calyx tubular, entire or shortly 5-toothed.*

púlchrum, Blume (*Æschynánthus púlchra,* Don. *Æ. púlcher,* DC.). Fig. 3840. Trailing: lvs. broadly ovate, distantly small-toothed: corolla glabrous, brilliant scarlet, 3 times longer than the glabrous greenish calyx. Java. B.M. 4264. R.B. 18: 13. R.H. 1883:204. P.M. 16:161.



3840. Trichosporum pulchrum.

Lobbiànum, Kuntze (*Æschynánthus Lobbiàna,* Hook.). The commonest species in cult. in this country: differs from *T. púlchrum* in narrower and nearly entire lvs., corolla downy and projecting only twice or less the length of the purple downy

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calyx. Java. B.M. 4260, 4261.—A very attractive plant when well grown.

T. Boschiànum, Kuntze (Æschynanthus Boschiana, De Vr. Æ. Lamponga, Miq.). Lvs. ovate or elliptic, obtusish, entire: calyx cylindrical, glabrous; corolla twice as long (2 in.), pubescent, scarlet. Sumatra. P.M. 13:175.—*T. fúlgens*, Kuntze (Æschynanthus fulgens, Wall.). Lvs. lanceolate: calyx tubular, short-toothed, glabrous; corolla about 2 in. long, orange-red, pubescent. E. Indies. B.M. 4891.—*T. javánicum*, Kuntze (Æschynanthus javanica, Hook.). Allied to T. pulchrum: differs in having a pubescent calyx and corolla. B.M. 4503. F.S. 6:558.—*T. longiflòrum*, Kuntze (Æschynanthus longiflora, Blume). Vigorous: lvs. 3–5 in. long: calyx deeply cut, the divisions linear-subulate; corolla tubular, scarlet, very long; fls. fascicled. Java. B.M. 4328. P.M. 15:25.—*T. macrócalyx*, Kuntze (Æschynanthus macrocalyx, C. B. Clarke). Lvs. 4–5 in. long, fleshy, oblong, acuminate: fls. axillary, solitary; calyx 1¾ in. long, lobes narrowly lanceolate, acuminate; corolla cylindrical-funnel-shaped, scarlet with dark purple nerves and spots. Siam.—*T. marmorátum*, Kuntze (Æschynanthus marmorata, F. Moore. Æ. zebrina, Van Houtte). Lvs. 3½ in. long, oblong-lanceolate, obovate-lanceolate or ovate, acuminate, reddish purple beneath: fls. axillary; corolla-tube green, curved, segms. ciliate, blotched with chocolate-brown. Habitat unknown.—*T. miniátum*, Kuntze (Æschynanthus miniata, Lindl.). Fls. vermilion, in 3's in the axils of the oval or elliptic entire lvs.; corolla pubescent. Java, Borneo. P.M. 16:65.—*T. speciósum*, Kuntze (Æschynanthus speciosa, Hook. Æ. splendens, Lindl. & Paxt.). Branches knotty: lvs. large, oval-lanceolate, nearly sessile, upper ones verticillate or in 3's: fls. fascicled, numerous; calyx with linear-subulate divisions; corolla large, orange-red, curved. Java. B.M. 4320. P.M. 14:199. Gn. 51:188.—*T. tricolor*, Kuntze (Æschynanthus tricolor, Hook.). Lvs. small, oval or lanceolate, hairy at the base: calyx obconic, pubescent; corolla small, pubescent, blood-red, throat orange, upper lobes striped black or purple; fls. mostly twin. Borneo. B.M. 5031. R.B.10:7. I.H. 5:169. F.S. 13:1384.

F. Tracy Hubbard.†

TRICHOSTÈMA (Greek, *hair* and *stamen*, referring to the filaments). *Labiàtæ*. Blue Curls. Hardy or half-hardy herbs, adapted to the wild-garden or rockery.

Leaves entire; floral lvs. similar: floral whorls axillary, densely or laxly many-fld.; calyx campanulate, 10-nerved, 5-toothed; corolla-tube slender, usually exserted, without a ring inside; limb subequally 5-cleft, lobes oblong or broadly declinate; stamens 4, didynamous; ovary deeply 4-lobed: nutlets obovoid, reticulately rugose.—About 10 species, N. Amer.

dichótomum, Linn. Bastard Pennyroyal. Low, viscid annual: lvs. oblong or lanceolate-oblong, obtuse, short-petioled: corolla blue or pink, sometimes white. Sandy fields, Mass. to Ky., Fla., and Texas.

lanàtum, Benth. A perennial shrubby plant with rosemary-like lvs. and cymes of fls. in a naked terminal thyrse: lvs. narrow-linear, 1-nerved, sessile, margins revolute: calyx and corolla covered with dense violet or purple wool; corolla ½in. long. S. Calif.—A very handsome shrub, known as "ramero."

Púrpusii, Brandeg. Perennial, somewhat woody, much branched, 1–1¾ ft. high: lvs. short-petioled, ovate, ¾–1¼ in. long, dark green: floral whorls axillary, few-fld., forming terminal loose leafy panicles: fls. showy, scarlet; corolla shortly hairy, about ¾in. long, upper lip helmet-shaped, 3-lobed, lower lip pendulous. S. W. Mex.

F. Tracy Hubbard.†

TRICHOSTÍGMA (named for the *hairy stigma*). *Phytolaccàceæ*. Three Trop. American erect or scandent shrubs, as defined by Walter in Engler's Das Pflanzenreich, hft. 39 (IV. 83), 1909, of which *T. peruviànum*, Walt. (*Rivìna peruviàna*, Moq. *Villamílla peruviàna*, Hook. f. *V. ròseo-cænìa*, Rusby. *Ledenbérgia ròseo-cænèa*, Lem.), may be expected to appear in choice warmhouse collections. It is a climbing woody plant prized for its ornamental lvs., prop. by cuttings under glass: 6 ft. or more tall, with slender branches: lvs. elliptic, acuminate, usually rounded or cordate but unequal at base, thickish, shining metallic green above and rose-violet beneath: fls. small and whitish, in elongated lax partially erect but becoming drooping racemes. Andean region. I.H. 16:591, which represents a handsome purple plant, with a long raceme of phytolacca-like fls.

Trichostigma is characterized by alternate petiolate entire oval or elliptic lvs. and hermaphrodite racemose small 4-parted fls.: sepals nearly equal, free, ovate or elliptic, reflexed in fr.; petals none; stamens 8–25, more or less inserted on the hypogynous disk; ovary 1-celled, the style very short or none: fr. berry-like, globular.

TRICUSPIDÀRIA (Greek, *three* and *points;* the petals are divided into 3 pointed lobes). Syn., *Tricúspis*. *Elæocarpàceæ*. Trees grown in the greenhouse, hardy in the extreme South where they are used as ornamentals.

Leaves alternate or opposite, serrate: peduncles axillary, solitary, 1-fld.: fls. rather large; calyx campanulate, truncate, obsoletely 5-toothed, deciduous; petals 5, 3-dentate or -lobed; stamens numerous; ovary 3–5-celled, ovules many in a cell: caps. leathery, usually angled, loculicidally 3–5-valved.—Two species, Chile. The accepted name is now **Crinodendron.**

C. depéndens, Schneid. (*Tricuspidària depéndens*, Ruiz & Pav.). Compact tree: lvs. broad oblong-obovate or obovate, apex rather blunt, crenulate-dentate: fls. white, campanulate, pedicels slender. Chile. B.M. 8115.—Intro. into Calif.

C. Patágua, Molina (*C. Hookeriànum*, Gay. *Tricuspidària depéndens*, Hook., not Ruiz & Pav. *T. hexapétala*, Turcz. *T. lanceolàta*, Miq.). Tree, up to 30 ft. high: lvs. elliptic or elliptic-lanceolate, apex acute, sharp-serrate: fls. red, hanging. Chile. B.M. 7160. G. 37:197. Gn. 70, p. 284. G.C. III. 47:75; 55, suppl. Jan. 10. G.M. 47:575. J.H. III. 61:61 (last four as *T. dependens*).

F. Tracy Hubbard.

TRICÝRTIS (Greek, *three convexities,* referring to the nectar-bearing sacs at the base of the three outer perianth-segments). *Liliàceæ*. Toad-Lilies. Half-hardy perennials, pretty garden plants; also used for pot culture.

Rhizome short-creeping: sts. erect, simple below the infl., leafy: infl. terminal, or laxly dichotomous in the upper axils: fls. few, rather large, somewhat long-pedicelled; perianth usually beautifully spotted inside, campanulate, segms. distinct from the base, lanceolate, acute; stamens 6; ovary oblong, 3-cornered, 3-celled: caps. narrowly oblong, prominently 3-cornered, septicidally dehiscent, erect, usually more than 1 in. long.—About 9 species, native to Japan and Formosa. Monographed by J. G. Baker in Journal Linnæan Society, vol. 17, p. 463 (1879).

3841. Tricyrtis hirta. (×½)

A. *Base of lvs. not clasping the st.*

B. *Plant not stoloniferous.*

formosàna, Baker. Sts. flexuous, about 1 ft. high: lvs. few, sessile, oblanceolate, acute, base cuneate, lower 4–5 in. long, ¾–1 in. broad, both surfaces green: fls. few, in a lax corymb, whitish purple, scarcely spotted, about ¾in. long; style as long as the stigmas. Formosa.

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BB. *Plant stoloniferous.*

stolonífera, Matsum. Herbaceous, 2 ft. high, with a stoloniferous base: st. reddish purple below, greenish above, at first hairy, later glabrous: lvs. elliptic-lanceolate, acuminate, narrowed to a sheathing base, 8 x 1¾ in., glabrous above, with dark blotches and sunken nerves: fls. purple, indistinctly blotched; perianth yellow at base, segms. elliptic, acute, 1 in. long, 2-lobately saccate at base. Formosa. B.M. 8560.

AA. *Base of lvs. clasping the st.*

B. *St. pilose, with spreading hairs.*

hírta, Hook. (*T. japónica,* Miq.). Fig. 3841. St. 1–3 ft. high, everywhere clad with soft whitish spreading hairs: fls. 6–15, racemose or subcorymbose, whitish, the outer segms. covered with rather large purple spots. Widespread in the woods of Japan. B.M. 5355. Gn. 30, p. 431; 49:290. V. 12:204. Var. **nígra,** Hort. (*T. nígra,* Hort.), has black instead of purple spots. Gn. 49:290. A form with variegated lvs. was once offered in this country.

BB. *St. not prominently hairy, puberulent or very slightly pilose.*

C. *Fls. yellow, unspotted.*

flàva, Maxim. St. dwarf: lvs. oblong-lanceolate: fls. racemose, yellow, not spotted. Seen by Maximowicz in the gardens of Yedo only.

CC. *Fls. spotted, not yellow.*

D. *Spots rather large.*

pilòsa, Wall. St. 2–4 ft. high, very slightly pilose: lvs. oblong: fls. numerous, loosely corymbose, whitish, with large purple spots; style half as long as the stigmas. Himalayas, 5,000–6,000 ft. B.M. 4955 (perianth-segms. narrow, oblong). F.S. 12:1219.

DD. *Spots minute.*

E. *Style as long as the stigmas.*

latifòlia, Maxim. St. glabrous, flexuous, 2–3 ft. high: lvs. broadly oblong or the uppermost ovate: fls. few in a terminal corymb, whitish, with minute purple spots; style as long as the stigmas. Japan.

EE. *Style half as long as the stigmas.*

macrópoda, Miquel. St. 2–3 ft. high, puberulous above: lvs. oblong: fls. in a loose corymb, whitish purple, with minute purple spots; style half as long as the stigmas. Blooms in June and July, according to J. B. Keller. Japan, China. B.M. 6544 (segms. broadly ovate, decidedly yellow, spotted red and veined red near tips).—In F. S. 18:1820 is figured a plant with sessile lvs. striated with white, and no fls., which he refers to *T. macropoda.* This was sent out by Van Houtte as *T. hirsuta,* but it is a glabrous plant and probably lost to cult. Var. **striàta,** Hort., is offered in the trade as a form with variegated green-and-white lvs.

3842. Trifolium repens.—The white clover. (×½)

T. grandiflòra, Hort., should be compared with T. hirta var. nigra. It is a name scarcely known to botany. It is said to have orchid-like fragrant fls. in Oct. and Nov. (Baker says the genus has no fragrant fls.). Dutch growers say that T. grandiflora has white fls. mottled with black.

WILHELM MILLER.
F. TRACY HUBBARD.†

TRÌDAX (an old Greek name used by Dioscorides, meaning *summer eating,* alluding to a plant that was a summer vegetable). *Compósitæ.* Hardy perennial herbs, possessing little beauty. Plants branched, hirsute or glabrescent: lvs. opposite, incise-dentate or pinnately cut, segms. few and narrow: heads medium-sized, long-peduncled, heterogamous: ray-fls. yellow, male disk-fls. greenish, fertile; involucre ovoid, campanulate or rather hemispherical; bracts few-rowed, slightly unequal: achenes turbinate.—About 27 species, Trop. Amer.; one species also occurs in India and Mauritius. Two species have been cult. occasionally. *T. coronopifòlia,* Hemsl. About 1 ft. high: lvs. variously pinnatifid or trifid, lobes linear: fls. yellow, rays 5-lobed. Mex. *T. trilobàta,* Hemsl. (*Galinsòga trilobàta,* Cav.). About 1 ft. high: lvs. 3-lobed or pinnately incised: fls. yellow; rays 5-toothed. Mex.

T. gaillardioides, Hook. & Arn.=Layia gaillardioides. F.S.R. 2:72.

TRIENTÀLIS (Latin for the third of a foot; referring to the height of the plant). *Primulàceæ.* STAR-FLOWER. CHICKWEED-WINTERGREEN. Very glabrous small perennials sometimes grown in wild borders.

Rhizomes slender, creeping: st. solitary, slender, erect: lvs. usually the same number as the petals, somewhat whorled, obovate-elliptical or lanceolate, very entire: peduncles 1–3-fld., filiform, without bracts: fls. white; calyx 5–9-parted, segms. linear-lanceolate, persistent; corolla rotate, 5–9-parted; tube very short, segms. elliptic-lanceolate, very entire; stamens 5–9; ovary free, globose: caps. globose, 5-valved, many-seeded.—Two species, one in Eu., the other in N. Amer.

A. *Lvs. acuminate at both ends.*

americàna, Pursh. St. naked below, 3–8 in. high, 5–9-lvd. at the summit: lvs. lanceolate: divisions of the white corolla finely acuminate. Damp woods, Lab. to Va.

AA. *Lvs. obtuse (acute in var. latifolia).*

europæa, Linn. St. either naked or with a few scattered lvs. below the cluster of obovate or lanceolate oblong, obtuse or abruptly somewhat pointed lvs.: divisions of the white or pink corolla abruptly acuminate or mucronate. Alaska, Eu., and Asia. Var. **árctica,** Ledeb. Dwarf: lvs. 1 in. long, decreasing below: corolla white. Var. **latifòlia,** Torr. St. naked below the cluster of 4–7 oblong-obovate, or oval, mostly acute lvs.: corolla white to rose-red. Woods, W. Calif. to Vancouver's Isl. By Pax & Knuth in Engler's Das Pflanzenreich, hft. 22, this plant is kept separate as *T. latifolia,* Hook., making 3 species in the genus.

F. W. BARCLAY.

TRIFÒLIUM (name refers to the three leaflets). *Leguminòsæ.* CLOVER. Low annual and perennial herbs, useful for cover-crops, soil-enrichment, and also in lawn-seed mixtures.

Leaves digitately 3-, rarely 5–7-foliate; stipules adnate to the base of the petiole: fls. usually purplish, red or white, rarely yellow, in spikes, heads, or umbels, or rarely solitary; calyx-teeth or lobes about equal or the lower longer, the 2 upper sometimes more or less connate; petals usually withering rather than falling off, more or less adnate to the base of the stamen-tube; stamens 9 and 1; ovary small, ripening into a few-seeded, mostly indehiscent pod.—Between 200 and 300 species, most abundant in the N. Temp. zone.

The clovers are very important agricultural plants, but they have little distinctly horticultural value except as cover-crops and green-manures. See *Clover,* page 805, Vol. II. For the rôle of clovers as nitrogen-fixers, see *Legumes,* page 1834, Vol. IV. The species described

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here are offered mostly as forage plants. Many clovers are perennial, although they are of relatively short life, so that frequent resowing is necessary if plants are to be kept in robust condition. Some of the species are annual, and these tend to become weeds. All are propagated readily by means of seeds; but as the seeds are small and oily, they may not germinate well in dry hot soils. Three annual yellow-flowered species are weeds in some parts, particularly in the East, where they have been introduced from Europe: *T. agrarium*, Linn., yellow or hop-clover, with oblong-obovate sessile leaflets; *T. procumbens*, Linn., low hop-clover, more spreading, leaflets obovate and the terminal one stalked; *T. dubium*, Sibth., with leaflets truncate or emarginate at apex and the terminal one stalked. A silky-pubescent white-flowered annual species from Europe, *T. arvense* Linn., is the rabbit-foot clover of fields and waste places. *T. odoratum* of seedsmen is evidently Melilotus. Allied genera are Lespedeza, Medicago, and Melilotus.

A. *Fls. in a long spike.*

incarnàtum, Linn. CRIMSON or SCARLET CLOVER. Fig. 1003, Vol. II. Annual, erect, 1–3 ft. high, soft-hairy: lvs. long-stalked, the lfts. broadly obovate and denticulate and sessile or nearly so by a cuneate base, the stipules large and thin and veiny and somewhat toothed: heads becoming 2–3 in. long, very dense: fls. sessile, bright crimson and showy, the calyx sharp-toothed and hairy. S. Eu. B.M. 328.—An escape in some places. Now much used as a cover-crop in orchards. See *Cover-Crops*. It is very showy when in bloom. If seeds are sown at midsummer or later, the plants may be expected to survive the winter and bloom early in spring.

rùbens, Linn. Perennial, 20 in. or less tall, in clumps, the sts. erect: lvs. short-stalked, the lfts. oblong-lanceolate and strongly denticulate, the stipules long-lanceolate: heads usually in pairs, becoming 3–4 in. long: fls. purplish red, showy. Eu.— Attractive ornamental species. The heads become silky after flowering. There is a white-fld. form.

AA. *Fls. in globular or ovate heads.*

B. *Corolla yellow.*

filifórme, Linn. YELLOW SUCKLING CLOVER. Annual, of diffuse growth: lfts. obovate or obcordate, somewhat denticulate, the terminal one stalked, the stipules broadly ovate: peduncles long and filiform, bearing sessile yellow fls. in umbel-like heads, the calyx-lobes unequal. Eu.—Sometimes used for forage or grazing, but little known in this country.

BB. *Corolla white or ochroleucous (yellowish white).*

alexandrìnum, Linn. EGYPTIAN CLOVER. BERSEEM. Annual, with appressed hairs, the sts. tall, erect or ascending and branching: lvs. numerous, the lfts. oblong or lanceolate and somewhat denticulate, the stipules lanceolate-subulate and partly free from the petiole: head stalked or sessile, ovate, becoming oblong-conic in fr.: fls. ochroleucous. Egypt, Syria.

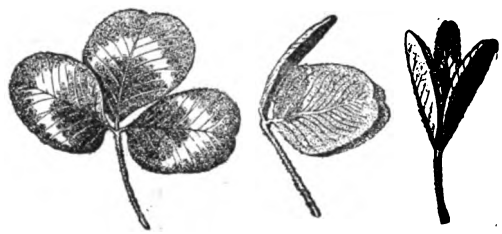
pannónicum, Jacq. HUNGARIAN CLOVER. Perennial, very hairy, the sts. usually simple, 2 ft.: lfts. lance-oblong and subacute to retuse, ciliate and entire, the stipules narrow and longer than the short petioles: heads ovate-oblong, stalked: fls. pale yellowish white or creamy yellow. Eu., Asia.—Handsome plant for the border; also recommended for forage.

rèpens, Linn. WHITE CLOVER. Fig. 3842. Low creeping glabrous perennial: lvs. long-stalked, the lfts. obcordate and obscurely toothed, the stipules small and scale-like: heads long-peduncled from the ground, small and loose: fls. white, fragrant. Eu. and thought to be native in the northern part of the U. S. and in Canada, but naturalized everywhere.—Much used in lawns, and in some parts prized for pasture. There are forms with red and purplish foliage. This is considered by most authorities to be the shamrock of Ireland. A form of it is offered as *T. minus*, "the genuine Irish shamrock." See *Shamrock*. Var. **atropurpûreum,** Hort., is a dwarf form: lvs. bronze, edged with bright green. Var. **pentaphýllum,** Hort., is a creeping rock-plant: lvs. have a bronze luster. Var. **purpûreum,** Hort., has fine bronzy purple foliage. The species assumes many forms.

BBB. *Corolla rose-tinted or red.*

C. *Individual fls. pedicelled.*

hýbridum, Linn. ALSIKE or SWEDISH CLOVER. Ascending or nearly erect, 1–3 ft. high, branching, glabrous: lvs. long-stalked, the lfts. obovate and serrulate,



3843. Day and night positions of red clover leaf; unfolding young leaf at the right.

stipules ovate-lanceolate and thin: heads small and loose, nearly globular, long-stalked: fls. rose-colored or sometimes white on the top of the head. Eu. B.M. 3702.—A good forage plant; also naturalized. Thrives best on moist lands. Very hardy. Perennial.

CC. *Individual fls. sessile.*

D. *Plant perennial.*

praténse, Linn. (*T. praténse perénna*, Hort.). COMMON RED CLOVER. PEA-VINE CLOVER. COW-GRASS. Fig. 3843. Ascending and somewhat hairy, 1–1½ ft.: lvs. long-stalked, the lfts. oval or obovate and sometimes notched at the end and the blade marked with a large spot, the stipules broad but with a bristle point: heads globular, ovate, sessile: fls. red-purple. Eu., but everywhere intro., and much grown for pasturage hay and green-manuring.

mèdium, Linn. MAMMOTH or ZIGZAG CLOVER. Stouter and less erect: lfts. oblong and entire and without spots: heads usually stalked, and fls. rather deeper colored. Eu., and intro., and much grown by farmers for hay and forage.

DD. *Plant annual.*

resupinàtum, Linn. (*T. suavèolens*, Willd.). Annual, diffuse or trailing glabrous plant: lfts. obovate and serrulate and as long as the petiole, the stipules lanceolate-acuminate: heads globose, with rudimentary involucre: fls. purple. Greece, Egypt to Persia.—Grown for ornament.

L. H. B.

TRIGLÒCHIN (Greek, referring to the *3-pointed fruit* of some of the species). *Alismàceæ*; or by Buchenau in Engler's Das Pflanzenreich, hft. 16 (IV. 14), 1903, placed in the *Scheuchzeriàceæ*. Thirteen species of linear-lvd. marsh plants of little value to the cultivator, although 1 species is listed abroad for planting in bogs or wet places. Perennial, erect: lvs. rush-like, more or less fleshy, sheathing at base: fls. small, spicate-racemose, on a long jointless naked scape, greenish; perianth of 3–6 parts; stamens 3–6; ovaries 3–6, united. *T. marítima*, Linn., the species mentioned, is widely distributed in the northern hemisphere along seashores and also in interiors: scape to 2½ ft. tall: lvs. thick: fr. ovoid or prismatic, pedicelled, in a long open racemose spike. The plant has a grass-like appearance and inconspicuous bloom.

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TRIGONÉLLA (Latin, *a little triangle;* probably referring to the shape of the fls.). *Leguminòsæ.* Annual or perennial herbs, usually strong-smelling: lvs. pinnately 3-foliate; lfts. with the veins often running out into teeth; stipules adnate to the petiole: fls. yellow, blue, or white, solitary, capitate, somewhat umbellate or shortly and densely racemose, sessile or peduncled at the axils; calyx tubular; petals free from the stamens, standard obovate or oblong; wings oblong, keel shorter than the wings, obtuse; stamens 9 and 1; ovary sessile or short-stipitate, many-ovuled: pod sometimes thick and long-beaked, sometimes linear, compressed or terete.—About 58 species, 1 from Austral., the others from Eu., Asia, and extra-Trop. Afr.

Fœnum-Græcum, Linn. FENUGREEK, which see. White-fld. annual, 1–2 ft. high, blooming in June and Aug. Distinguished from other species in its section by the erect unbranched st. and obovate lfts., which are obscurely dentate; stipules lanceolate-falcate, entire: calyx pilose: pods falcate, twice as long as the beak. Eu., Orient. F. TRACY HUBBARD.†

TRIGONÍDIUM (Greek, *three* and *small angle,* alluding to the triangular form of several parts of the plant). *Orchidàceæ.* Epiphytic herbs, grown in the warmhouse.

Stems very short, soon thickened into fleshy 1-2-lvd. pseudobulbs: lvs. leathery, not folded, linear or oblong: scape from below the pseudobulb or from a simple rhizome, many-sheathed, 1-fld.: fls. rather large, short-pedicelled, between spathe-like bracts; sepals about equal, connivent or coherent into a 3-angled tube at base; petals much smaller than sepals; lip erect, lateral lobes clasping the column, midlobe spreading, fleshy or callous at base; column without wings and footless; pollinia 4.—About 10 species, Trop. Cent. and S. Amer.

spatulàtum, Lind. & Reichb. f. Pseudobulb ovate, 2-edged: lf. broadly ligulate, 8 in. long: fl. terminal; dorsal sepal ovate from a ligulate base, acute, lateral sepals oblong-lanceolate, acute, all yellowish purple; petals lanceolate, with a fleshy disk below the apex; lip narrow, angulately 3-lobed, midlobe transversely semi-ovate, rather acute. Colombia.

subrèpens, Rolfe. Rhizome subrepent, stout: pseudobulbs rather distant, oblong, somewhat compressed, obscurely 3-ribbed, about 1 in. long, 1-lvd.: lf. ligulate, rather obtuse, 6–7 by about ½in., rather leathery: scape 6–7 in. high, with numerous lanceolate sheaths; dorsal sepal rhomboid-oblanceolate, about 1 in. long, lateral suboblique, broad-elliptic, all greenish yellow; petals whitish with 3 brown lines, narrowly elliptic-oblong; lip greenish yellow, with brown radiating veins on the side lobes, 3-lobed, short, midlobe oblong. Habitat unknown.

The following species are sometimes found in cult.: *T. acuminàtum,* Batem. Pseudobulbs ovate, acute, sulcate: lf. linear: fl. dull straw-color, penciled with rich brown inside; sepals acuminate recurved at apex; petals oval-lanceolate. British Guiana.—*T. Egertoniànum,* Batem. Pseudobulbs clustered, oval, compressed, 2-lvd.: lvs. narrow ensiform, often 1½ ft. long: fl. pale liver-color, dashed and veined with brown; sepals acute, the lateral ones reflexed; petals slightly acute. Honduras.—*T. latifòlium,* Lindl. Lvs. obovate-oblong, 6 x 2 in.: fls. yellow and purple; lip with a fleshy yellow front lobe and narrow purplish side ones.—*T. obtùsum,* Lindl. Pseudobulb oblong or elongate obovoid, 2-lvd., compressed: lvs. linear-lanceolate: fl. terminal; sepals reddish yellow, obovate; petals white, veined with rose, brown at the apex, obtuse; lip white, dorsally tubercled, lateral lobes red-margined, midlobe yellow in front. British Guiana. B.R. 1923.—*T. ténue,* Lodd. Pseudobulbs oval, compressed, 1-lvd.: lf. ensiform, very acute: fl. brownish purple; sepals reflexed, very acuminate; lip obtuse, glabrous, reflexed at apex. British Guiana. F. TRACY HUBBARD.

TRÍLISA (anagram of Liatris). *Compósitæ.* Autumn-blooming plants 2 to 3 feet high, with numerous small, purple or white, rayless flower-heads.

Closely related to Liatris, from which it differs in the fibrous roots (those of Liatris being tuberous): the infl. panicled instead of racemose or spicate, and the involucral bracts in only 2 or 3 series, while those of Liatris are in many series.—Two species. Trilisa is not so well known to gardens as the liatris. Although a native of the low pine barrens from Va. to Fla. and La., it is hardy at N. Y., along the coast. It is mentioned in some English books as a hardy plant, thriving in light soil and prop. by division or by seeds sown in autumn. It is more fully described in the native botanies.

odoratíssima, Cass. (*Liàtris odoratíssima,* Michx.). VANILLA PLANT. Also called Carolina vanilla, dog's-tongue, etc. Rather stout, glabrous, perennial herb, 2–3 ft. high, corymbosely branched above: lvs. thick, entire or sometimes dentate, obtuse, 4–10 x 1–1½ in., oblong, ovate or oval, sometimes spatulate: infl. corymbose-paniculate: fl.-heads about ¼in. long. Aug., Sept. B.B. 3:319.—The other species (*T. paniculata,* Cass.) has a similar range and is distinguished by its viscid-pubescent st. and thyrsoid-paniculate infl.

WILHELM MILLER.

TRÍLLIUM (Latin, *triplum,* triple: leaves and floral parts in threes). *Liliàceæ.* WAKE-ROBIN. BIRTHROOT. WHITE WOOD LILY. GROUND LILY. Interesting and handsome perennial herbs, hardy and very useful for spring-flowering in the wild border or rockery or even in the garden border.

3844. Vertical rhizome of trillium. (×½)

Rhizome short, thick, ascending or horizontal; sts. simple, erect, sheathed at base: lvs. 3, whorled at the top of the st., broad, subsessile or long-petioled, 3–5-nerved: fls. 1, between the lvs., sessile or pedicellate, erect, cernuous or reflexed, violet, lurid, white or greenish; perianth persistent, segms. distinct, spreading, 3 exterior thin herbaceous, green or rarely colored, 3 inner petal-like usually larger, spreading sometimes recurved; stamens 6; ovary with a broad base, sessile, ovoid or subglobose, 3-celled: berry globose or ovoid, usually 3-ribbed, indehiscent. —About 30 species, N. Amer. and extra-Trop. Asia from the Himalayas to Japan.

Trilliums are amongst the characteristic flowers of American woods. The best-known species is *T. grandiflorum,* which ranges from Canada to the mountains of North Carolina and extends westward beyond the Great Lakes. All trilliums delight in moist rich soil. They thrive in woods mold. The root is a deep-seated mostly perpendicular rhizome (Fig. 3844). It is customary to transplant trilliums from the woods when in bloom. This is because the plants can be found readily at that time and because the desire to grow them is strongest when the plants are in flower. It is better to transplant in midsummer, or later, however, when the growth is completed, although the plants are difficult to find after the tops have died. The bloom is made largely from the energy stored in the tuber the previous season. After flowering, the plant stores energy for the succeeding year. By midsummer this work is accomplished and the tops die: then the plants are at rest and they are in proper condition to be moved. However, good results are sometimes secured by moving them in spring. These remarks will apply to most early spring-blooming small herbs. Give trilliums a rich deep rather moist soil in partial shade. Plant deep. A colony will last for years. Trilliums force well. See *Forcing.* Plants may be propagated by seeds sown as soon as ripe. Blooming plants may be expected in two or three years. Trilliums are among the choicest of all

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early spring plants, and they should be more common in gardens. They can be made to thrive well in borders about city yards. They may also be colonized in grass where the lawn-mower is not used. Best results are usually attained, however, when they are planted alone in masses.

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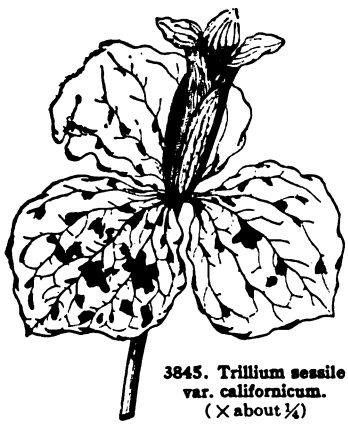


3845. Trillium sessile var. californicum. (×about ¼)

KEY TO THE SPECIES.

A. *Ovary 3-lobed, not winged.*
  B. *Peduncle longer than the lvs.* ..... 1. **rivale**
  BB. *Peduncle shorter than the lvs.*
    C. *Lvs. oblong, acute* ..... 2. **nivale**
    CC. *Lvs. ovate, acuminate* ..... 3. **undulatum**
AA. *Ovary 6-angled, often winged.*
  B. *Fls. sessile.*
    C. *Lvs. sessile.*
      D. *Blades broadly ovate or rhomboidal* ..... 4. **sessile**
      DD. *Blades lanceolate* ..... 5. **lanceolatum**
    CC. *Lvs. petioled.*
      D. *Petioles short: petals oblong-lanceolate* ..... 6. **recurvatum**
      DD. *Petioles as long as the blade or longer: petals oblanceolate* .... 7 **petiolatum**
  BB. *Fls. pedicelled.*
    C. *Pedicel longer than the fl.: lvs. nearly or quite sessile.*
      D. *Sepals much shorter than the petals* ..... 8. **grandiflorum**
      DD. *Sepals nearly or quite as long as the petals.*
        E. *Petals narrowly lanceolate or narrowly ovate (fls. white)* .. 9. **ovatum**
        EE. *Petals ovate or broadly ovate (usually purplish).*
          F. *Filaments stout, much shorter than the anthers* .. 10. **e ectum**
          FF. *Filaments slender, as long as the anthers or nearly so* ..... 11. **Vaseyi**
    CC. *Pedicel generally not exceeding and usually much shorter than the fl.*
      D. *Fl. erect* ..... 12. **pusillum**
      DD. *Fl. declinate under the lvs.*
        E. *Lvs. rhombic or orbicular-rhombic* ..... 13. **cernuum**
        EE. *Lvs. ovate-lanceolate* ..... 14. **stylosum**

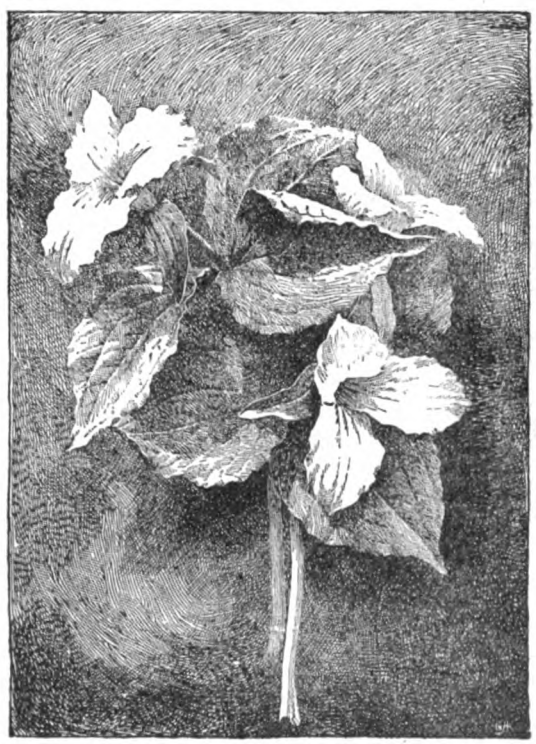
1. **rivàle,** Wats. Sts. slender, 2–8 in. high: lvs. lanceolate, rounded or subcordate at base, acute or acuminate, 1–2 in. long; petioles 1–15 lines long: fls. white, on a slender rather erect or at length declinate pedicel, which is a little shorter than the lvs; petals rather rhombic, acute or acuminate, ½–1 in. long, more or less marked with purple. Stream-banks, mountains of Ore. and Calif. G.C. III. 54:43.—Allied to *T. nivale*, which it closely resembles in habit.

2. **nivàle,** Ridd. A dwarf species, 5 in. or less high, early: lvs. narrow and obtuse, 1–2 in. long: fls. white, on a short erect or declined pedicel, the petals about 1 in. long, narrow and nearly or quite obtuse. Low woods, Pa. and Ky. to Minn. and Iowa. B.M. 6449.

3. **undulàtum,** Willd. (*T. erythrocárpum*, Michx. *T. pictum*, Pursh). Of medium to large size, 1 ft. or more high: lvs. large, ovate and acute or acuminate, short-stalked: fls. rather large, white, on a short but slender erect or inclined pedicel, the petals oblanceolate and wavy, about 1 in. long and usually purplish at the base. Woods, Nova Scotia to Mo. and Ga. B.M. 3002. L. B.C. 13:1232.

4. **sèssile,** Linn. Strong-growing, 1 ft. or less high: lvs. broadly ovate or rhomboidal, acute, more or less spotted: fls. sessile in the whorl of lvs., small, purple or greenish, the petals narrow and acute. Woods, Pa. to Minn., Ark., and Fla. B.M. 40. L.B.C. 9:875. F.S. 22:2311.—Variable. Var. **gigantèum,** H. & A. (var. *angustipétalum*, Torr.). Similar to var. *californicum*, but the lvs. somewhat petiolate and the petals narrower. Calif. and Ore. Apparently not in the trade. The forms of *T. sessile* appear to be the only trilliums native to Calif. except *T. ovatum*. Var. **californicum,** Wats. (var. *gigantèum*, Torr.). Fig. 3845. Much stouter, the lvs. often 6 in. long and spotted, and the petals sometimes 4 in. long: fls. purple, rose-color, or white, the petals rhombic-ovate or narrower. Calif. and Ore. G.F. 3:321 (adapted in Fig. 3845). Var. **Núttallii,** Wats. (*T. viridéscens*, Nutt.). Lvs. pubescent beneath, as also the upper part of the st.: petals linear-lanceolate, purplish green with brown base. Ark. Var. **rùbrum,** Hort. A form of var. *californicum*, with fls. deep red-purple. Var. **Wràyi,** Wats. (*T. discolor*, Wray). Petals spatulate-obtuse, 1 in. long, greenish. Ga. B.M. 3097.

5. **lanceolàtum,** Boykin (*T. recurvàtum* var. *lanceolàtum*, Wats.). Plant often more than 1 ft. tall: lvs. lanceolate, sessile: fls. dull or brown-purple, an inch or



3846. Trillium grandiflorum. (×½)

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more long, narrow-lanceolate or linear, the sepals ascending or somewhat reflexed, the filaments usually exceeding ¼in. in length. Ga. and Ala.—Little known in cult.

6. **recurvàtum,** Beck. Strong-growing, usually 1 ft. or more high: lvs. ovate or ovate-oblong, tapering to both ends, on short but slender petioles: fls. brown-purple or dull purple, about 1 in. or more long, the petals narrow and erect, the sepals narrow and reflexed. Woods, Ga. to Minn., Miss. and Ark.

7. **petiolàtum,** Pursh. St. scarcely arising above the ground: lvs. ovate-elliptic to reniform, with stalks as long as the blade or even longer (blade 3–5 in. long): fls. purple, the petals 1–2 in. long and narrow-oblanceolate, the sepals erect. Idaho, Ore. and Wash.—Little known in cult.

8. **grandiflòrum,** Salisb. Figs. 1558 (Vol. III), 3846. Stout, 1 ft. or more high: lvs. broad-ovate or rhombic-ovate, narrowed to both ends, often wavy: fls. erect or nearly so, pure white, changing to rosy pink as they fade, 2–3 in. long, the petals broadly oblanceolate and spreading and much longer than the sepals. Que. to Minn., Fla., and Mo. B.M. 855 (as *T. erythrocarpum*). L.B.C. 14:1349. G.C. III. 37:308. G. 9:663; 22:67; 28:173; 29:213; 36:703. G.L. 25:395. Gn. 29, p. 257; 36, p. 394; 40:222; 73, p. 167. G.M. 33:131. Gn.M. 8:172. G.W. 10, p. 36. F.W. 1880:257. Mn. 4:17. A.G. 17:243. Gng. 4:305; 6:161.—Sporting forms are not uncommon. Sometimes forms occur with petiolate lvs. A.G. 13:206. *T. grandiflorum* is the best and handsomest species for cult. Var. **ròseum,** Hort. (*T. ròseum,* Hort.), is a form with pink fls. Gn. 76, p. 229.

3847. Trillium erectum. (×⅓)

9. **ovàtum,** Pursh. Much like *T. grandiflorum,* but the petals narrow-lanceolate or narrow-ovate, the sepals usually nearly as long as the petals: plants 1 ft. or less high: lvs. ovate to nearly orbicular, often somewhat rhombic. Calif. to Brit. Col.—The Pacific coast representative of *T. grandiflorum.*

10. **erèctum,** Linn. (*T. pèndulum,* Willd. *T. purpùreum,* Kin. *T. fœtidum,* Salisb. *T. atropurpùreum,* Curtis). Fig. 3847. Stout, 1 ft. or more high: lvs. broadly rhombic-ovate: pedicel usually bent over or inclined but sometimes erect: fls. brown-purple to greenish purple, the petals usually about 1 in. long, ovate to lanceolate, not much if any exceeding the sepals. Nova Scotia to Man., N. C. and Mo. B.M. 470. L.B.C. 19:1838. F.S. 10:990. Mn. 2:49. G.C. II. 19:605. G.W. 10, p. 36.—The fls. of *T. erectum* are ill-smelling. Var. **álbum,** Lodd., has white fls. B.M. 1027. L.B.C. 19:1850. Var. **viridiflòrum,** Hook. Fls. greenish. B.M. 3250. Not known to be in the trade.

11. **Vàseyi,** Harbison. St. erect from a horizontal rootstock, 10–20 in. high, glabrous: lvs. sessile or subsessile, broadly roundish-rhomboidal, abruptly acuminate, 4–8 in. long: fls. dark purple, recurved or deflexed; sepals lanceolate to ovate-lanceolate, acute; petals about the same length, ovate or broadly ovate, acute or obtuse. N. C., Tenn., and Ga., in the mountains.—Allied to *T. erectum.*

12. **pusillum,** Michx. Small, usually not 1 ft. high: lvs. lanceolate or oblong, obtuse, sessile: fls. pale flesh-color, less than 1 in. long, on a short erect pedicel, petals lanceolate and exceeding obtuse petals. Pine lands, N. C., S. C.

13. **cérnuum,** Linn. Plant 1 ft. or more high: lvs. very broadly rhombic-ovate, nearly or quite sessile: fls. white, the petals 1 in. or less long, ovate-lanceolate, wide-spreading or reflexed, undulate, equaling or exceeding the sepals. Newfoundland to Ga. and Mo. B.M. 954. Mn. 10:49.

14. **stylòsum,** Nutt. (*T. nervòsum,* Ell., and *T. Càtesbæi,* Ell.). Slender, 12–18 in. high: lvs. ovate-lanceolate, narrow at each end, short-stalked: fls. rose-color, the petals oblong, obtuse or acute, curved, undulate, sometimes 2 in. long. N. C. to Fla.

T. Govenìànum, Wall. A species of Temp. Himalaya, little known and described by Hooker as follows: "Lvs. shortly petioled, ovate or ovate-cordate, acute: sepals subequal, narrowly linear."—*T. obovàtum,* Pursh. Founded on a Canadian plant, which has been referred to T. erectum. Maximowicz keeps it distinct, however, extending its range to Kamchatka and Japan. It is the T. erectum var. japonicum, Gray. According to Watson, the Japanese plant "is distinguished by a somewhat produced connective (between the anther-cells) and very short stigmas." Maximowicz says that the plant differs from T. erectum in the petals being broader and more obtuse and longer than the calyx, the fls. nodding from the first, and the lvs. broader than long, sessile, not attenuate at the base.—*T. Smàllii,* Maxim. One of the T. erectum series (T. erectum var. japonicum flore-pleno, Gray), of Japan. Fls. smaller than those of T. obovatum (2 in. across), deep tawny red, the petals not exceeding the sepals, nearly orbicular or obovate.—*T. Tschonóskii,* Maxim. About 1 ft. tall: lvs. sessile, broad-ovate or orbicular, somewhat rhombic, acuminate: fls. dull purple, 1 in. or less across, the petals oblong-lanceolate. According to Hooker, this differs from T. erectum chiefly in the longer filaments. Himalaya to Japan.

L. H. B.
F. Tracy Hubbard.†

TRIÓSTEUM (name shortened by Linnæus from Triosteospermum, which is from Greek for *three bony seeds*). *Caprifoliàceæ.* Feverwort. Horse Gentian. Coarse hardy perennial herbs, glabrous or glandular-pilose: sts. rather simple, terete: lvs. opposite, sessile, rather fiddle-shaped or obovate, entire: fls. usually axillary, solitary or clustered, dirty white, yellow, or purple; calyx-tube ovoid, limb 5-lobed, persistent; corolla tubular-campanulate, base of tube gibbous, limb oblique, lobes unequal; stamens 5; disk small, swollen; ovary 3–5-celled: berry fleshy or leathery, 2 (rarely 3–5)-celled, 2–3-seeded.—About 8 species, N. Amer., Himalayas, and China.

perfoliàtum, Linn. St. 2–4 ft. high, stout: lvs. ovate, shortly acuminate, narrowed below into connate-perfoliate or simply connate base: corolla dull brown-purple. Rich soil, New England and Canada to Ill. and Ala. B.B. 3:234.—Sometimes offered by collectors. It is a weedy plant of very easy cult. F. W. Barclay.

TRIPETALÈIA (Greek, *three* and *petals*). *Ericàceæ.* Two species of Japanese shrubs with deciduous alternate, short-petioled entire lvs. and white or pinkish fls. in terminal racemes or panicles: sepals and petals 3; stamens 6, shorter than the petals, the anthers opening with a longitudinal slit; ovary 3-celled, superior, short-stalked; style slender, curved: caps. septicidal, many-seeded. Closely allied to Elliottia, but easily distinguished by its 3-merous fls. *T. paniculata* has proved hardy at the Arnold Arboretum; it seems to like humid, but well-drained, peaty or sandy soil and will probably grow best in a rockery in a partly shaded place. The second species was only recently intro. and has not yet been tested. Prop. is by seeds treated like those of rhododendron and probably also by cuttings. **T. paniculàta,** Sieb. & Zucc. Shrub, to 6 ft.: lvs. short-petioled, rhombic or rhombic-obovate, acute, cuneate at the base, glabrous except a few hairs on the midrib beneath, 1–2½ in. long: fls. in panicles 2–4 in. long, white, tinged pink, ⅓in. long, style exserted; bracts subulate. Aug.

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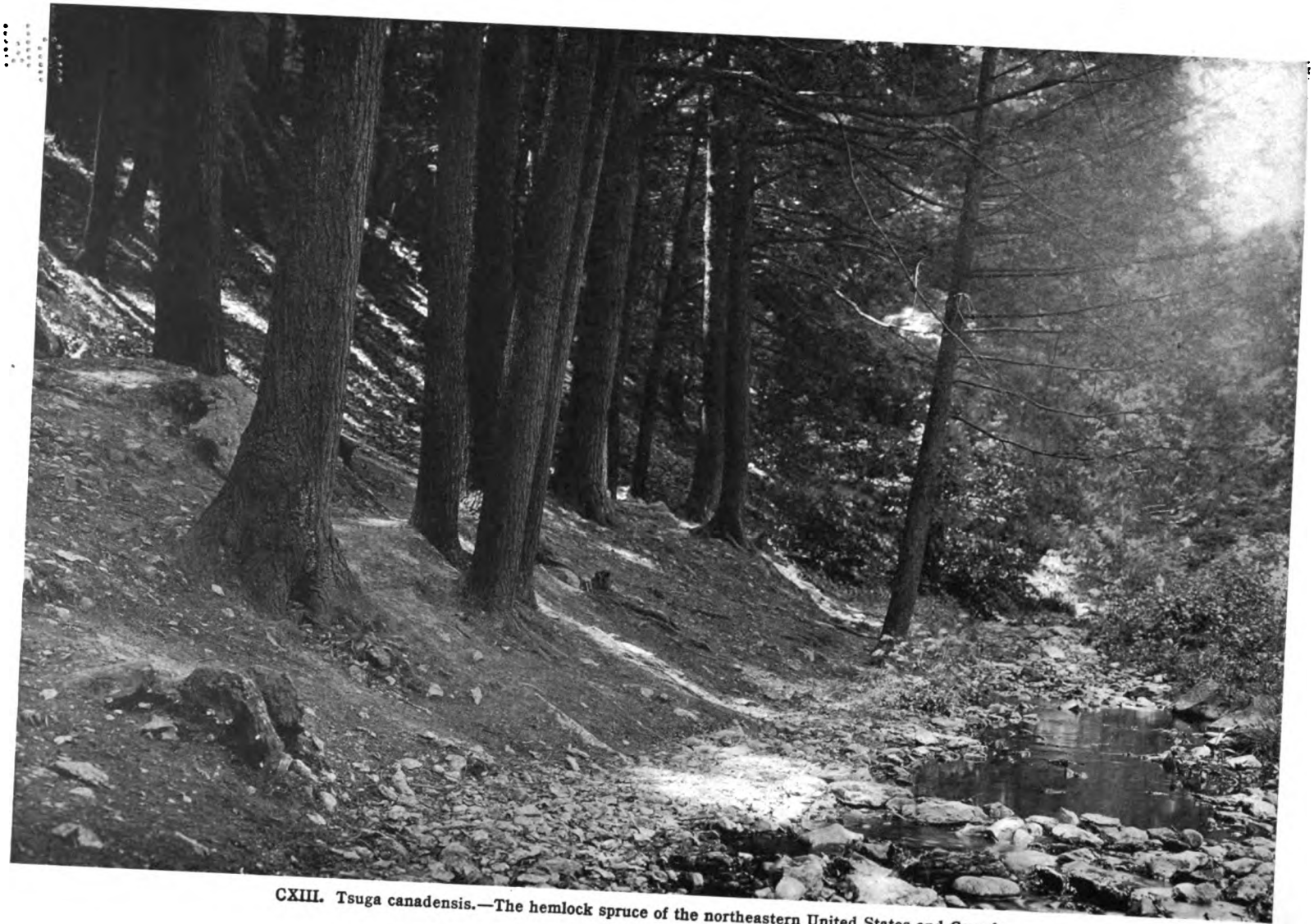

CXIII. Tsuga canadensis.—The hemlock spruce of the northeastern United States and Canada.

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Japan. **T. bracteàta,** Maxim., has smaller obovate obtuse lvs. and pink fls. in racemes, with elliptic or obovate bracts. Japan. ALFRED REHDER.

TRIPHÀSIA (from the Greek for *triplex*). *Rutàceæ*, tribe *Citreæ*. Small ornamental shrubs or trees distantly related to the orange, sometimes used as hedge-plants.

Plants with spreading branches: spines double, axillary; lvs. alternate, sessile, trifoliate: fls. cupulate, 3-merous, white, stamens 6, free: fr. an ovate berry filled with a sweet, sticky pulp and containing usually a solitary seed.—Only 1 species is known.

trifòlia, P. Wilson (*Limònia trifòlia*, Burm. *T. aurantiòla*, Lour. *T. trifoliàta*, DC.). LIME-BERRY. Fig. 3848. A shrub or small tree, sometimes attaining a height of 15 ft.: lvs. trifoliolate, dark green; lfts. ovate, retuse, entire-margined, lateral ones smaller than the central one; spines in pairs, straight, very sharp, shorter than the lvs.: fls. white, fragrant, axillary, solitary; petals thick; stamens free, filaments subulate, shorter than the corolla; style thick, longer than the stamens: fr. ovate, small, dull red, ½in. diam., having a thick skin, 1-celled, generally with only a single large seed, imbedded in the mucilaginous spicy pulp. Burmann, Fl. Ind., tab. 35. Jacq. Icon. pl. rar. v. 3, pl. 463. L.B.C. 1:18. Riss. & Poit. Hist. nat. or. 2 ed., pl. 108.—Of unknown nativity but widely cult. and naturalized in tropical and subtropical regions, being grown as an ornamental plant. Prop. by seed. The frs., which are filled with a highly aromatic juicy pulp, are sometimes used in tropical countries for making marmalade. The shrub is attractive, flowering and fruiting freely and is used for lawn planting and hedges, but it is injured by severe frosts. This species is able to grow in soil too salty to support the common citrous frs. and is being tested as a stock for use on such soil. WALTER T. SWINGLE.

TRIPHÒRA (Greek, *bearing three flowers*). *Orchidaceæ*. Terrestrial plants with leafy sts. and fleshy tubers. Fls. axillary, solitary or several; sepals free, equaling the petals; lip erect, not crested, spurless, 3-lobed; column elongated, clavate; pollinia granular-powdery, tailless. —Species about 10, American. By some authors retained in Pogonia.

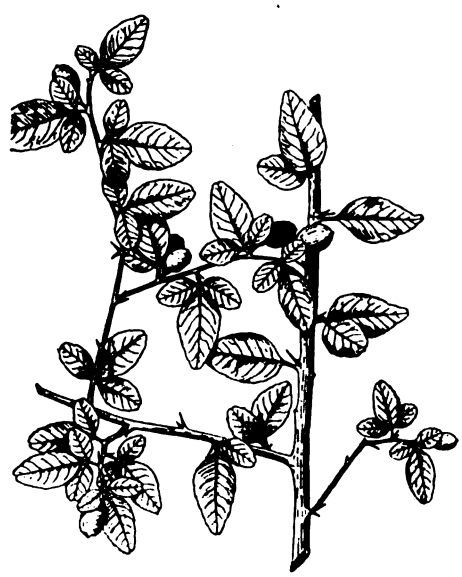
trianthóphora, Rydb. (*T. péndula*, Nutt. *Pogònia péndula*, Lindl.). Sts. sometimes tufted, 2–12 in. tall: lvs. nearly orbicular to ovate, 2–8 in. long, clasping: fls. single, or 2–7, drooping, pale purple; sepals and petals obtuse, elliptic; lip about as long as petals, narrowed into a short claw. E. N. Amer. B.R. 908. GEORGE V. NASH.

TRIPLÀRIS (Latin, from *triplex*, the parts of the fructification are in 3's). Syn., *Velasquèzia*. *Polygonàceæ*. Trees grown out-of-doors in the extreme S., in the warmhouse in the N. Lvs. alternate, short-petioled, usually large, ovate-oblong or lanceolate: fls. sessile or subsessile between bracts, arranged in pilose, simple, long spikes or often in racemes, dicœcious; male perianth funnelform, limb 6-cleft, stamens 9, ovary rudimentary or none; female perianth narrow, deeply 6-cleft, ovary acutely 3-angled: nut prominently subacutely 3-angled. —About 20 species, Trop. S. Amer.

americàna, Linn. Small tree: lvs. petiolate, ovate, acuminate: spikes pilose, bracts ovate, acuminate, small, pilose: calyx in fr. very long, tube ovate with spreading lanceolate wings; lobes subulate: achene ovate, 3-angled. Cent. Amer.—An insufficiently studied and much confused species.

TRÍPSACUM (Greek, to *rub* or *thresh*, probably alluding to the ease with which the fertile spike can be broken up). *Gramíneæ*. Perennial grasses with stout culms and monœcious infl., in spikes terminating the culm and branches: fls. monœcious, in the same spike, the staminate above; spikes terminal and axillary; staminate spikelets 2-fld., in pairs at each joint; pistillate single, 1-fld., imbedded in each joint of the rachis, so that the smooth cartilaginous axis and the outer glume form a nearly cylindrical mass; at maturity the pistillate spikes separate into the joints.—Species about 6, of the warmer parts of N. Amer., one extending north to Cent. U. S. and in many places furnishing considerable native fodder.

dactyloides, Linn. (*T. violàceum* and *T. Dáctylis* of the trade). GAMA-GRASS. SESAME-GRASS. Culms in bunches, 4–7 ft.; spike 2–3 at summit and often single from the upper axils. Moist soil, Conn., Ill., Kans.,



3848. Triphasia trifolia. (×½)

and southward. Dept. Agric., Div. Agrost., 20:13.—A wild fodder-grass, sometimes cult. for forage and also in gardens as a curiosity. Raised from seed, or more certainly from cuttings of the rootstocks.

For an illustrated account of Tripsacum-Euchlæna and Tripsacum-Zea crosses, see article by Collins and Kempton, Journal of Heredity, March, 1916. A. S. HITCHCOCK.

TRIPTERÝGIUM (Greek, *three* and *wing*, in reference to the 3-winged fr.). *Celastràceæ*. Three shrubs from E. Asia with deciduous alternate rather large lvs. and small white fls. in terminal panicles: fls. polygamous; calyx 5-lobed; petals 5; stamens 5, inserted at the margin of a cupular disk; ovary superior, 3-angled, incompletely 3-celled, with short style: fr. a 3-winged, 1-seeded nutlet. The following species has proved hardy at the Arnold Arboretum and is a handsome shrub conspicuous chiefly on account of its large bright green foliage contrasting well with the reddish brown sts. terminated in July and Aug. by conspicuous panicles of small whitish, fragrant fls. It apparently grows well in any soil. Prop. is by seeds and probably by cuttings. **T. Régelii,** Sprague & Takeda (*T. Wilfórdii*, Regel, not Hook. f.). Glabrous shrub, to 2 ft., with angled warty reddish brown branches: lvs. petioled, broadly elliptic, acuminate, broadly cuneate at the base, serrate, 3–6½ in. long.: fls. greenish white, ⅓in. across, in terminal panicles leafy at the base, and to 8 in. long: fr. little over ½in. long, with 3 broad wings. July, Aug. Manchuria, Korea, Japan. Gt. 18:612. Not yet in the American trade. ALFRED REHDER.

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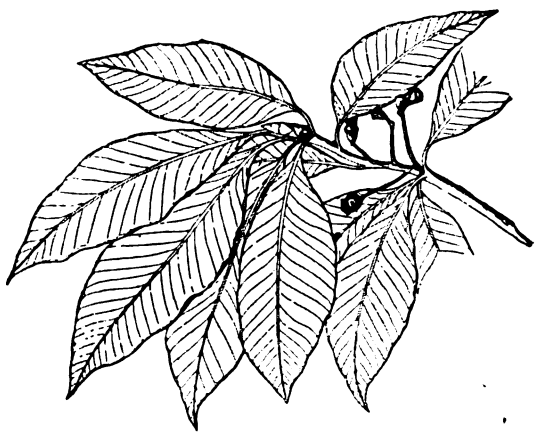
TRISÈTUM (Latin, *three* and *bristles:* the florets are 3-awned). *Graminex.* Tufted hardy perennials of no real horticultural interest: infl. terminal spike-like or loose panicles: spikelets 2 (rarely 3–5) -fld.; rhachilla prolonged beyond the upper palea; glumes unequal, keeled; lemma membranaceous, keeled, 2-toothed at apex, bearing a slender dorsal awn; palea narrow, 2-toothed. About 90 species, widely distributed throughout the temperate regions of the world. *T. flavéscens,* Beauv. (*Avèna flavéscens,* Linn.). Culms 1½–2½ ft. high, erect, simple, glabrous: sheaths shorter than the internodes; ligule ½in. long; blades 1½–5 in. long, 1–3 lines wide: panicle open; branches somewhat flexuous: spikelets 3–4-fld.; glumes smooth or scabrous; awn long, bent, and twisted. Eu., Asia, and intro. into Amer. B.B. (ed. 2) 1:217. Not in common cult., but occasionally used in agriculture. F. TRACY HUBBARD.



3849. Tristania conferta. (×⅓)

TRISTÁGMA (Greek, *three drops,* alluding to the 3 nectar-glands of the ovary). Including *Stephanolírion. Liliàceæ.* Herbs with subglobose tunicate corms, used for fall-blooming. Lvs. radical, few, narrowly linear: scape simple, leafless: fls. in a terminal umbel, not numerous, pedicelled; perianth salver-shaped, tube cylindrical, 6-lobed; crown fleshy at the throat or lacking; stamens 6, in 2 rows; ovary sessile, ovoid, 3-celled: caps. loculicidally dehiscent.—About 7 species, Chile and Patagonia; probably to be planted in spring in this country.

nivàle, Poepp. (*Mílla nivàlis,* Baker). Lvs. 6–9 in. long, about 2 lines wide: scape slender, about 1 ft. long: fls. 1 in. long, 2–8 in an umbel, the segms. linear and greenish; crown none.—Now treated by Baker as *Brodiæa nivalis,* Baker. Likely to be offered by Dutch bulb-growers.

T. narcisséides, Benth. & Hook., does not appear to be in the American trade. It is 1 ft. or more high, with short narrow-linear lvs., and white fls. bearing a bright orange narcissus-like crown of 3–6 broad unequal more or less connate scales.

F. TRACY HUBBARD.†

TRISTÀNIA (in honor of Jules M. C. Tristan, 1776–1861, a French botanist). *Myrtàceæ.* Tall trees or shrubs, evergreen, cultivated as greenhouse shrubs in Europe and hardy in California and Florida.

Leaves alternate or somewhat whorled and approximate at the ends of the branches, rarely opposite: fls. usually rather small, yellow or white, in axillary, peduncled cymes; calyx-tube turbinate-campanulate, limb with 5 short segms.; petals 5; stamens numerous; ovary inferior or semi-superior.—About 23 species, Malaya, New Caledonia, and Austral. Prop. by half-ripened cuttings in sand under glass, or by seeds.

conférta, R. Br. (*Lophostèmon arboréscens,* Schott). BRISBANE BOX. Fig. 3849. An umbrageous tree attaining 150 ft.: young shoots and calyx hoary-pubescent: lvs. 3–6 in. long, ovate-lanceolate, glabrous, usually crowded at the ends of the branches and apparently verticillate: fls. mostly on the branches well below the lvs.; petals about ¼in. long, white and spotted, fringed. Queensland. B.R. 1839 (as *T. macrophylla*). —A handsome evergreen shade tree, valuable for avenues in hot dry regions, as it withstands great drought; it also produces timber valued for strength and durability. Much grown in New S. Wales as a boulevard tree. Hardy in Cent. Calif., withstanding an exceptional temperature of 26° F. at Berkeley.

JOSEPH BURTT DAVY.

TRISTELLATEÌA (Latin, *three* and *star:* each flower has 3 winged frs. which have the appearance of stars). *Malpighiàceæ.* Scandent shrubs, probably adapted only to the warmhouse. Lvs. opposite or verticillate in 4's, entire, petioles usually 2-glandular at the top, base with 2 very short stipules: racemes terminal or lateral, sometimes paniculate: fls. yellow; calyx 5-parted; petals clawed, keeled outside, sagittate-ovate; stamens 10, all perfect; ovary 3-lobed: samaræ 3, many-winged. About 20 species, Madagascar, Indian Archipelago, and Austral. *T. austràlis,* A. Rich. Strong climbing shrub with pendent shoots: lvs. ovate or ovate-oblong, 2–4×1–2¼ in., glabrous: racemes 2–6 in. long, 12–16-fld.: fls. opposite, short-peduncled, yellow; petals 5, oblong or ovate-oblong, 5–6 lines long; filaments finally deep red. Malaya and Australasia. B.M. 8334.

TRITELEÌA: *Brodiæa.* The following species, listed under Triteleia, is to be combined with the treatment of Brodiæa in Vol. I, p. 576. **B. uniflòra,** Baker (*Triteleìa uniflòra,* Lindl. *Mílla uniflòra,* Graham). SPRING STAR-FLOWER. Lvs. narrow-linear, 1 ft. or less long: scapes 8 in. or less tall, bearing a bract-like spathe toward the top: fl. 1 (rarely 2), 1–1½ in. across, pale lilac or pale blue, with pointed segms. violet-streaked through the center. Argentina. B.R. 1921. B.M. 3327. G. 3:115; 36:610. Gn. 67, p. 203; 68, p. 365. Gt. 61, p. 219. G.W. 15, p. 624. R.H. 1859, pp. 350, 351. Gng. 2:59. Hardy in most of the northern states, although it does not persist long. Grown chiefly as a pot-plant for spring bloom. Var. **cærùlea,** Hort., has porcelain-blue fls. There are other horticultural forms. *T. violacea,* with "delicate violet fls.," is probably a form of this species rather than the *T. violacea,* Kunth, a Chilean species. L. H. B.

TRITHRÌNAX (apparently *triple Thrinax,* alluding to leaf-division). *Palmàceæ,* tribe *Córypheæ.* South American fan palms, some of which are known to be cultivated in the open in the United States.

The genus is distinguished from allied genera chiefly by the following characters: fls. hermaphrodite; petals imbricate; filaments connate into a tube: carpels distinct; styles long, distinct, terminal in fr.—Five species. *T. brasiliensis* is a little-known palm. It seems to have been confused in the trade with *Thrinax Chuco,* which is referred in this work to *Acanthorhiza Chuco.* The lf.-segms. of the former are bifid; of the latter apparently not. André says the first species described below is unique by reason of its sheaths at the base of the lvs. These, he says, "are composed of fibers which are at first parallel and longitudinal, then obliquely intercrossed and finally plaited at right angles like the mats of pandanus in which the coffee of the Antilles and Bourbon is exported. At the summit these narrow strips unite and form a series of very long, robust, recurved spines which are evidently designed to protect the fls. and frs. against climbing animals." Not in common cult. in Amer., although 3 of the 5 known species are planted.

brasiliénsis, Mart. Trunk slender, 6–12 ft. high, 2–3 in. thick: lvs. palmate-flabelliform, glabrous and often

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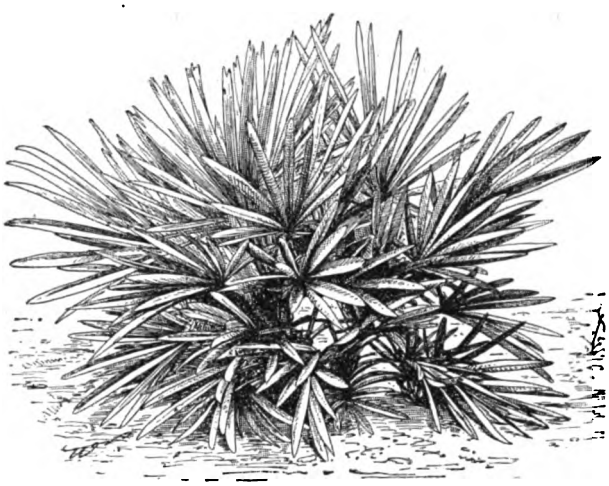
glaucous, the lf.-segms. 22–30, linear, free for two-thirds their whole length, deeply bifid: spadix much branched, with many spirally arranged fls. on its branchlets: stamens 6. Brazil. I.H. 22:202.

campéstris, Drude & Gris. Fig. 3850. Differs from *T. brasiliensis* in the segms. being shallowly bifid and



3850. Trithrinax campestris.

white-tomentose above but nearly glabrous beneath, and with stouter spadix branches: plant more rigid. Argentina.—Said to be a striking palm.

acanthócoma, Drude. Dwarf, stout, with many strong reflexed spines, the caudex with netted sheaths: lvs. large, fan-like, cut nearly to base into about 40 narrow bifid segms.: spadix branched. Brazil. Gt. 27:361.

L. H. B.†

TRÍTICUM (old Latin name for wheat). *Gramineæ.* The genus as now limited comprises 2 sections, Ægilops, with 12 species of S. Eu. and Asia, one of which is thought by some to be the original of the cult. wheats; and Triticum proper, which includes wheats and spelts themselves, that are referred by Hackel to 3 species. Annual grasses with fls. in a terminal spike: spikelets 2–5-fld., placed flat-wise, singly on opposite sides of a zigzag rachis; glumes ovate, 3- to many-nerved, these and the lemmas more or less awned: grain free. The common wheat is *T. æstivum,* Linn. (*T. sativum,* Lam. *T. vulgare,* Vill.). (For account of a wild species of Syria, the probable ancestor of wheat, see Aaronsohn, Bull. Soc. Bot. France, 56:237). *T. Richardsonii,* Trin. Under the name *Cryptopyrum Richardsonii,* Schrad., this species has sometimes been catalogued by seedsmen as an ornamental plant. It is a perennial with a slender nodding spike of awned spikelets. The species properly belongs in Agropyron (*A. Richardsonii,* Schrad.) and resembles the wild *A. caninum,* Linn., with which some authors unite it. It is native from Que. across the continent.

A. S. Hitchcock.

TRÍTOMA: *Kniphofia.*

TRITÒNIA (name explained as follows by Ker-Gawler, its author: "Name derived from *Triton,* in the signification of a vane or weathercock; in allusion to the variable direction in the stamens of the different species"). Including *Montbrètia. Iridàceæ.* Blazing Star. Showy-flowered corm-bearing herbs used both as greenhouse and summer-blooming subjects.

Corms or bulbs small, covered with fibrose sheaths or tunics: sts. simple or slightly branched: lvs. few, narrow-linear or broader and sword-shaped, usually falcate: spathes disposed along the rachis or the few branches, short, membranaceous, often 3-toothed: fls. 1 to a spathe, sessile; perianth-tube slender, limb concave or broadly campanulate, lobes obovate or oblong, nearly equal; ovary 3-celled: caps. membranaceous, ovoid or oblong.—About 50 species, S. Afr. Allied to Crocosmia, Acidanthera, Sparaxis, and Gladiolus. Few of them are in general cult., although many of the species have been intro. at one time or another. Those of the Montbretia class are showy hardy summer-flowering bulbs, to be handled like gladioli; or they may be left in the ground permanently if given protection of mulch in cold climates. As far north as N. Y. and Mass., however, they are usually best wintered in damp (not wet) earth indoors. The best-known kinds are *T. crocosmæflora* and *T. Pottsii.* Most of the Latin names in catalogues belong to these, as *sulphurea, tigridia, pyramidalis, grandiflora, elegans, floribunda.* To gardeners, tritonias are usually known as montbretias. Garden tritonias grow 1 ft. or more tall, producing several to many showy fls. of a yellow, orange, or red color, and bearing several stiffish linear or sword-shaped lvs.

A. *Three lower perianth-segms. bearing hatchet-shaped processes.*

bracteàta, Worsley. True lvs. about 3, appearing after flowering, about 1 ft. high and ½in. broad; the early lvs. are really bracts: scape about 1 ft. high, flexuous, much branched: fls. 30–40, tawny red, scentless, opening singly or in 2's, subtended by the large foliose bracts, irregular in shape, about 1 in. across; outer segms. about ¼in. broad, inner segms. about ⅛in. broad and recurved. S. Afr.

AA. *Three lower perianth-segms. without hatchet-shaped processes.*

B. *Fls. hooded.*

Clusiàna, Worsley. Allied to *T. securigera,* from which it differs in having lvs. twice as long and wide, no obtuse or other indentation on the outer spathe-valves: plant about 1 ft. high: fls. orange (?), hooded, all facing one way. S. Afr.—This species with hooded fls. seems to form a link between Tritonia and Antholyza.

3851. Tritonia Pottsii. (×½)

BB. *Fls. not hooded.*

C. *Perianth-segms. obovate.*

crocàta, Ker-Gawl. Slender, simple or branched from near the base, bearing few fls. in loose 1-sided racemes: fls. about 2 in. across, tawny yellow or orange-red, the stamens one-third the length of the perianth-limb. Cape Colony. B.M. 184 (as *Ixia crocata*). Gn. 54: 82. Var. **miniàta,** Baker (*T. miniàta,* Ker-Gawl.), has light red fls. B.M. 609. There are color varieties, as **purpùrea,** Hort., **coccín-**

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ea, Hort., and **aurantiaca,** Hort.—These plants are usually treated as greenhouse bulbs in the N.

cc. *Perianth-segms. oblong.*

rósea, Klatt. Tall and branched, with short linear lvs. and loose 6–15-fld. racemes: fls. bright red, with oblong segms. (the 3 lower ones yellow-blotched at the base) as long as the tube and anthers just protruding from the tube. Cape Colony. B.M. 7280.—Can be left in the open as far north as Mass., if well protected, but are usually safer if taken up.

Pŏttsii, Benth. (*Montbrètia Pŏttsii,* Baker). Fig. 3851. Strong branching plant 2–4 ft. tall, with several lax racemes, and few or several firm narrow lvs.: fls. about 1 in. long, bright yellow tinged red, the tube broadly funnelform and twice longer than the oblong unequal ascending segms., the stamens about half the height of the limb. Natal, Transvaal, etc. B. M. 6722. G.C. III. 7:301, showing how the corms form one above the other.

3852. Tritonia crocosmæflora. (×½)

crocosmæflòra, Lemoine (*T. Pottsii* × pollen of *Crocosmia aurea* [Fig. 1112, Vol. II]). Fig. 3852. Slender much-branching erect plant 3–4 ft. high, with several or many sword-shaped lvs., and loose more or less distichous racemes: fls. 2 in. across, orange-crimson, with a slender curved tube nearly or quite equaling the oblong spreading segms. R.H. 1882: 124. Gn. 25, p. 363; 31:490. G. M. 36: 484. G.Z. 27:169.—*Crocosmia aurea* was intro. (into England) in 1847, and *Tritonia Pottsii* (into Scotland) in 1877 by G. H. Potts. Victor Lemoine, at Nancy, France, hybridized the two, and the product, *T. crocosmæflora,* bloomed in 1880. This hybrid is now the most popular of tritonias (or montbretias).

The following varieties are offered in the trade under the generic name Montbretia; as they are mainly color-forms it seems inadvisable to make new combinations for them, and they are accordingly retained under the trade name. *Montbrètia crocosmæflòra* var. *aurantìaca,* Hort. (*M. aurantìaca,* Hort.), has deep orange fls. Var. *califórnica,* Hort. (*M. califórnica,* Hort.), has golden yellow fls. Var. *germània,* Hort. (*M. germània,* Hort.), has glowing orange-scarlet fls., with blood-red throats. Var. *pyramiddlis,* Hort., is offered in the trade. Var. *speciòsa,* Hort. (*M. speciòsa,* Hort. *T. speciòsa,* Hort.), is said to have close spikes of rich deep yellow fls., the reverse side apricot. J.H. III. 48:391.

Some of the following plants occur in the trade under Montbretia and have never been transferred to Tritonia. They are little known botanically and in some cases are probably hybrids or forms of T. crocosmæflora and are here listed as Montbretias as signified by the M. before the specific name.—*T. aùrea,* Pappe (M. aurea, Hort.). See Crocosmia aurea.—*T. crispa,* Ker-Gawl. Fl. whitish or pale pink, with oblong, obtuse segms. and with crisped lvs. B.M. 678.—*T. deùsta,* Ker-Gawl. Differs from T. crocata in having a purple-black blotch on the claw of the 3 outer segms. B.M. 622.—*M. élegans,* Hort., has yellow and apricot fls.; possibly a form of T. crocosmæflora.—*T. flàva,* Ker-Gawl. Fls. bright yellow, the segms. oblong and the 3 lower ones with a callus in the throat: lvs. very short. B.R. 747.—*M. germànica,* Hort., is offered in the trade as a form with scarlet fls., shaded with orange, 3 in. across.—*T. hyalìna,* Baker. Differs from T. crocata in having the perianth-segms. narrowed at the lower part into a claw with hyaline margin. B.M. 704 (as T. fenestrata).—*T. linedta,* Ker-Gawl. Fls. white or pink, with short oblong segms. and protruding anthers, of the shape of gladiolus fls. B.M. 487 (as Gladiolus lineatus).—*M. Promètheus,* Hort., is a horticultural form which grows up to 4 ft. high, with branching spikes of rich orange or orange-red fls., 3½ in. across, their center crimson. Gn. 71, suppl. Jan. 19. G.M. 49:815.—*M. rósea,* Hort., is offered in the trade as a form growing 3 ft. or more high with long arching spikes of rose or bright salmon-rose fls.—*T. scillàris,* Baker. Small and slender: fls. pink, with wide-flaring narrow segms., ixia-like. B.M. 629 (as Ixia polystachya).—*T. securìgera,* Ker-Gawl. Lvs. short: fls. red or copper-colored, the 3 lower segms. with a callus on the claw. B.M. 383 (as Gladiolus securiger).—*T. undulàta,* Baker. Lvs. short and narrow, much crisped: fls. pink, with oblong equal segms. B.M. 599 (as Ixia crispa).—*T. viridis,* Ker-Gawl. Lvs. plane or crisped, linear: fls. green, with nearly equal oblanceolate segms. B.M. 1275.—*T. Wilsonii,* Baker. Lvs. very narrow-linear: racemes simple or forked, lax, few-fld.: fls. white, tinged with purple, the segms. obovate-cuspidate.

L. H. B.
F. Tracy Hubbard.†

TRIUMFÉTTA (named for Giov. B. Trionfetti, 1658–1707 or 8). *Tiliàceæ.* Herbs, subshrubs, or shrubs, which have been sometimes grown in the warmhouse or greenhouse. Plants stellate-pubescent: lvs. serrate, entire, or 3–5-lobed: fls. yellow, axillary or opposite the lvs., few or densely fasciculately cymose; sepals 5; petals 5, rarely none; stamens numerous; ovary 2–5-celled, each 2-ovuled: caps. small, subglobose, spiny or bristled. About 100 species, widely dispersed over the world. Several species have been intro. abroad but none of them is cult. to any extent.

TROCHÈTIA (named for R.I.G. du Trochet, 1771–1847, Paris). *Sterculiàceæ.* Shrubs or trees, evergreen, grown in the warmhouse or coolhouse. Lvs. entire, leathery: peduncles axillary, 1–3-fld.: fls. usually pendulous, rather large; calyx 5-parted, leathery; petals 5, flat, broad, and persistent; staminal column short, bearing 5 ligulate staminodia; anthers 10, 15, or 20, stipitate; ovary sessile, 5-celled, cells with many ovules: caps. loculicidally 5-valved.—About 6 or 7 species, natives of Mauritius, St. Helena, and Mascarene Isls.

Blackburniàna, Bojer. Shrub or small tree: branches, petioles, and ribs of the lvs. rusty-scurfy with stellate hairs: lvs. long-petioled, elliptic- or obovate-oblong, acute, entire, or crenate-serrate, 7-ribbed from the base, which is slightly cordate: peduncles above the axils, 1-fld., 2-bracted: fls. large, campanulate; sepals elongated lanceolate; petals obliquely obovate-rotundate, white, rose-veined, margins blood-red. Mauritius. B.M. 7209. G.C. III. 36:112.

TROCHODÉNDRON (Greek, *wheel* and *tree,* alluding to the appearance of the fls., the anthers of the numerous spreading stamens forming a ring.). *Trochodendràceæ.* Evergreen tree with aromatic bark and foliage, with alternate or whorled long-petioled lvs. and small fls. in terminal upright racemes: fls. long-pedicelled, perfect, without perianth; stamens numerous, filaments slender: carpels 6–10 in one whorl, connate below, with short linear spreading styles: fr. consisting of 6–10 follicles inserted below in the fleshy receptacle, dehiscent at the apex, with several linear seeds in each carpel. The tree is probably not in cult. in this country, but may be recommended for its handsome evergreen foliage for the middle and southern Atlantic states and for Calif. *T. aralioìdes,* Sieb. & Zucc. Tree, to 50 ft., or in cult. spreading shrub, glabrous: lvs. rhombic-obovate to elliptic-lanceolate, obtusely acuminate, crenate-serrate, lustrous and dark green above, lighter green beneath, 2–5 in. long; petioles 1–3 in. long: fls. green, ¾in. broad across the stamens; anthers yellow: fr. brown, ½–¾in. across. June. S.Z. 1:39. B.M. 7375. S.I.F. 1:42. G.C. III. 15:725. J.H.S. 27, p. 867. R.B. 30:86.

Alfred Rehder.

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TRÓLLIUS (old German, *trol*, something round; *trollblume*, in allusion to the shape of the flowers). *Ranunculàceæ*. GLOBE-FLOWER. A group of neat hardy herbaceous perennials of a dozen or more species, mostly found in moist or marshy places of the North Temperate zone; useful in garden borders.

Roots fibrous, thickened: lvs. palmately divided or lobed: fls. large, solitary, whitish, yellow, golden yellow, or purplish, those in cult. usually yellow- or orange-fld.; petals 5 to many, small, unguiculate, with a nectariferous pit at the base of the blade; sepals 5–15, large, usually constituting the showy part of the fl.; stamens many; carpels 5 to many, sessile, many-ovuled: follicles in a head.—Very like Ranunculus in general appearance, but distinguished at once by bearing follicles rather than achenes. For monograph, see Huth, in Helios ix. (Berlin), 1892; and for the Eastern Asian species, Finet & Gagnepain, Contrib. Fl. As. Or. 1: 136–139; also in Bull. Soc. Bot. France 51:393–396 (1904).

Trolliuses are grown for the beauty of their globular flowers and show of dark green leaves. They are suited to wet sunken gardens, wild borders, and edges of water-gardens, although in a good garden soil not lacking in moisture they do well. They may be increased either by seeds or by dividing the old plants; but the young plants grow slowly at first, and will not flower before the second season from seed. The usual globe-flower of the horticulturist is *T. europæus*, with incurving sepals so that the flower has a ball-like appearance; in most of the species the sepals spread nearly or quite horizontally. They bloom in spring and early summer.

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A. *Number of sepals exceeding 10 (15–20).*

B. *Sepals incurved, forming a globe-shaped fl.*

1. **europæus,** Linn. (*T. globòsus*, Lam.). Fig. 3853. Sts. erect, 15 in. or more high, often branching: lower lvs. petioled, others sessile; lfts. only 5-parted, lobed, cleft, and toothed, those of the root-lvs. on short petioles: fls. of a lemon-yellow color, solitary or in 2's, 1–2 in. across, globular in form; sepals 10–15, ovate; petals spatulate, often longer than the stamens: fr. much as in *T. laxus*. Wet upland meadows of N. Eu. May–July. Gn. 40:102; 71, p. 310. G. 19:609. G.W. 15, p. 129. J.H. III. 51:594; 54:555.—Different forms are offered or sometimes listed. Var. **Lóddigesii,** Hort., has deep yellow fls.

Var. **napellifórmis,** Huth (*T. napellifórmis*, Roep.). St. many-fld. and lvs. deeply divided.

BB. *Sepals spreading, making an open fl.*

C. *Petals longer than the stamens.*

2. **asiáticus,** Linn. Plant much like *T. europæus*, often taller, the smaller bronze-green lvs. more finely lobed and cleft: fls. a rich orange-color with sepals spreading. May. Siberia. B.M. 235.—The blossoms of this are well suited for cut-fl. purposes. The plants thrive best and produce richest colors if partially exposed to the sun. *T. gigantèus*, found in garden lists, is a very tall form of this species.

CC. *Petals shorter than the stamens or not exceeding them.*

3. **dschungáricus,** Regel. Much like *T. europæus*, but fls. open or spreading, golden yellow within and reddish outside; sepals about 15, rounded and mucronate; style subulate and straight. Turkestan.—Mentioned in foreign lists.

4. **altàicus,** C. A. Mey. (*T. caucásicus* var. *altàicus* Fin. & Gagn.). Plant 1–2 ft., with foliage much like that of *T. europæus:* fls. large (2 in. across), yellow or pale orange, with 15–20 broad and obtuse sepals (perhaps sometimes as few as 10); petals 5–15, narrowly linear and obtuse. Altai region, Siberia. Gt. 6:66.—Little known in the trade.

AA. *Number of sepals 5–10, spreading.*

B. *Petals one-third or one-half longer than the stamens.*

5. **Lédebouri,** Reichb. f. Plant about 2 ft., with lvs. divided to the base and the divisions lobed and toothed: fls. yellow, with 5 spreading veined ovate sepals; petals 10–12, narrowly linear, not prominent but surpassing the stamens. Siberia.—Listed, but apparently little known horticulturally.

6. **chinénsis,** Bunge (*T. sinénsis*, Hort.?). Long regarded as a form of *T. asiaticus*, but now separated: stout striate glabrous herb: radical lvs. obsolete; lower st.-lvs. reniform and the upper orbicular-reniform, sometimes 7 in. across, palmately 5-parted, the segms. broad-oblanceolate: sepals 12 or 13, the outer ones broad-ovate and obtuse, the inner ones rather longer and narrower; petals 20, linear, over 1 in. long, exceeding the glabrous stamens. N. China. B.M. 8565.—

3853. Trollius europæus (×½).

In English gardens this species is said to thrive well and to seed freely when grown in the bog-garden or beside water.

7. **japónicus,** Miq. St. low (4–8 in. high), scape-like and 1-fld., the lvs. being radical and involucrate: fl. yellow, with 5 or 6 sepals which are 1 in. or less long. Japan.—Sometimes combined with *T. chinensis;* apparently closely allied to *T. laxus*. Franchet & Savatier, in Flora of Japan, maintain the species as distinct.

BB. *Petals about equaling the stamens in length (or somewhat shorter in No. 10 var.), and shorter than the sepals.*

8. **pátulus,** Salisb. Low, 1 ft. or less high: radical lvs. palmately dissected, the segms. incised-dentate: fl. golden yellow; sepals usually 5, sometimes 6 or 7, ovate and spreading; petals and stamens nearly equal, the former 1–5; style erect and about equaling the ovary. Caucasia to Persia.—Finet & Gagnepain define this species very broadly, to include others. They make var.

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genuìna, Fin. & Gagn. to include *T. laxus*, Salisb., *T. pumilus*, Don, and *T. pumilus* var. *yunnanensis*, Franch; also var. *Lédebouri*, Fin. & Gagn. (*T. Lédebouri*, Reichb. f.), differing from the type in having the sepals longer than the stamens.

9. **caucásicus,** Stev. (*T. pátulus* var. *caucásicus*, Huth). Radical lvs. palmately dissected, the segms. incised-dentate: sepals 5–8, elliptic, spreading; petals 10, about equaling the stamens; style about equaling the ovary. Caucasia, Armenia, etc.—Perhaps a form of *T. patulus*, as considered by Huth. Under the name *T. caucasicus*, the plant offered abroad is described as a hardy perennial, with large orange fls. in June and July; 2–3 ft. In horticultural literature the fls. are usually described as globular, which raises a question as to the identity of the cult. plant.

10. **púmilus,** Don. St. 1 ft. or less high, from a horizontal rootstock, the base bearing old lvs., with few lvs. on the st. and those above the middle: lvs. small, 1–2 in. diam., orbicular, thickish, 5-parted, the segms. broadly obovate and 3-lobed: fls. 1 in. across, solitary, yellow; sepals 5 or 6, rounded, notched at the end; petals 10–12, about equaling the stamens, cuneate-oblong: follicles many. Alpine Himalaya.

Var. **yunnanénsis,** Franch. St. to 2 ft. high and sometimes 3-fld.: lvs. narrowly dentate, the teeth short and rigidly mucronate; cauline lvs. 1 or 2: sepals 6–8, broadly ovate or suborbicular; petals long-clawed, shorter than stamens. W. China.—Described as horticulturally not unlike *Caltha palustris*, but superior, with dark green lvs. and bright golden yellow salverform fls.

BBB. *Petals shorter than the stamens and scarcely equaling the filaments, and shorter than the sepals.*

11. **láxus,** Salisb. (*T. americànus*, Muhl.). Sts. slender, weak, ½–2 ft. long, somewhat ascending: radical and lower st.-lvs. long- or short-petioled; all the lvs. 5–7-parted; lfts. cuneate and much cleft and toothed: fls. usually solitary, 1–2 in. across; sepals 5–7, entire or toothed at the end, more spreading than the other species; petals many, much shorter than the stamens: follicles ¼in. long, straight beak one-fourth as long: head of fr. ¾in. across. Bogs and damp places, Mich., to New England and Del. and westward. May–July or Aug. B.M. 1988 and L.B.C.:56 (both as *T. americanus*).

Var. **albiflórus,** Gray (*T. albiflórus*, Rydbg.). Much like the type but usually lower, more slender: lfts. usually 5: fls. pale or white; petals nearly equaling the stamens. Mountain tops, Colo., northward and westward.

12. **acáulis,** Lindl. Plant only 3–4 in. high: lvs. as in the above, or only 5-parted: fls. lemon-yellow, spreading, on sts. hardly reaching from the ground; sepals 9, nearly lanceolate, acute, sometimes toothed; petals spatulate, shorter than the stamens. N. India. B.R. 29:32.

T. aurantiacus, Hort., described as lemon-yellow: probably a form of T. europæus.—*T. Excélsior*, Hort., and *T. hýbridus*, Hort., with deep orange fls., are probably T. europæus forms.

K. C. Davis.
L. H. B.†

TROPÆOLUM (from Greek word for *trophy;* the leaves are shield-shaped and the flowers helmet-shaped). *Tropæolàceæ*. Nasturtium of gardens (but not of botanists). Climbing or rarely diffuse soft-growing herbs, grown in the garden for their showy flowers.

Roots fusiform, sometimes tuberous: lvs. alternate, peltate or palmately angulate, lobed or dissected; stipules none or rarely minute, bristle-like or dissected: peduncles axillary, 1-fld.: fls. irregular, usually orange or yellow, rarely purple or blue, but the garden forms now show a great range of color; sepals 5, connate at their base, posterior produced into a long slender spur; petals 5 or fewer by abortion, usually narrowed into distinct claws, two upper smaller or dissimilar and inserted in the mouth of the spur; stamens 8, free, unequal, with declined usually curving filaments; ovary 3-lobed, 3-celled, ripening into 3 1-seeded indehiscent carpels (these constitute the "seed" of commerce).—About 45 species, S. Amer., chiefly from the cooler parts of Peru and Chile. Monographed in 1902 by Buchenau in Engler's Pflanzenreich hft. 10 (IV. 131).

The common species, *T. minus* and *T. majus*, are also grown for their young pods and seeds, which are made into pickles. The peppery-tasting leaves are sometimes used like cress, in salads, whence the name "Indian cress" in England. In America this use of the plant is little known. Certain kinds, particularly *T. tuberosum*, produce edible subterranean tubers.

3854. Flower of Tropæolum minus. One of the lower petals shown at *a*. (×½)

Tropæolums thrive in any warm sunny fairly moist place. The tops are tender to frost. For early effects, seeds may be started indoors in pots or boxes. The common climbing species are *T. majus* and *T. peltophorum*, both of which are very useful for window-boxes, balconies, for covering banks and walls, and for growing amongst shrubbery. The common dwarf species, *T. minus*, is earlier and usually more floriferous, and is very useful for the front row in the border. On rich soils, nasturtiums produce very heavy foliage that overtops the bloom. *T. peregrinum*, the canary-bird flower, is grown either indoors or in the open. Probably most species are perennial. Many of them are tuberous and withstand some frost at the root; but the half-hardy species are little known in this country.

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A. *Species annual or perennial but not tuber-bearing.*

B. *Petals 5, entire or rarely emarginate or crenate at the apex.*

C. *Inferior petals not ciliate at the base.*

D. *Plants perennial, low, prostrate, glabrous.*

1. **polyphýllum,** Cav. Perennial, half-hardy: st. succulent, prostrate or climbing: lvs. peltate, orbicular, cut beyond the center into 7–9 narrow divisions: fls. much like *T. majus* in shape, but smaller; spur slender but rather short, the calyx-lobes triangular; petals obovate-cuneate, unguiculate, yellow, wavy or emarginate, the 2 upper ones streaked with red. Chile. B.M. 4042. P.M. 10:175. F.S. 20:2066. G.C. II. 20:241. Gn. 45, p. 158. G.M. 58:367. St. naturally prostrate.—**T. Leichtlínii,** Hort. Garden hybrid between *T. polyphyllum* and *T. leptophyllum* (see suppl. list), raised by Max Leichtlin, of Baden-Baden. More closely approaching the former, but with larger lvs., more

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numerous and more vivid-colored fls. and said to be more hardy.

DD. *Plants perennial, tall, scandent.*

2. **speciòsum,** Poepp. & Endl. Half-hardy slender climbing vine: lvs. peltate at the base, short-petioled, parted to the base into 6 obovate-oblong obtuse divisions or lfts.: pedicels very slender, red, fls. shaped much like those of *T. majus*, but smaller, vermilion-red, showy, upper cuneate, lower almost quadrate. Chile. B.M. 4323. F.S. 3:281. P.M. 14:173. Gn. 37, pp. 253, 545; 61, p. 274; 79, p. 68. R.H. 1904:88.—A perennial fleshy-rooted plant, hardy in England.

3855. Tropæolum majus, the common climbing nasturtium. (×⅓)

CC. *Inferior petals ciliate at base (near the claw).*

D. *Plant pubescent.*

3. **peltóphorum,** Benth. (*T. Lobbiànum*, Veitch). Annual, climbing, hairy all over except the under parts of the lvs. and the petals: lvs. very long-stalked, peltate, nearly orbicular, undulate and with points on the margin: fls. large, long-spurred, orange-red, the 2 upper petals large, rotundate, broad and entire, the 3 lower ones small and clawed and coarsely toothed and also fringed on the claws. Colombia. B.M. 4097. F.S. 2:67. P.M. 11:271. Gn.M. 9:16. Var. **fimbriàtum,** Hubb. (*T. Lobbiànum* var. *fimbriàtum*, Hort.), has all the petals toothed or fringed. R.H. 1856:101. Seldom seen in its pure state. Var. **hederifòlium,** Hubb. (*T. Lobbiànum* var. *hederifòlium*, Hort.), has variegated lvs. which resemble those of *Hedera helix* in shape. Var. **miniàtum,** Hubb. (*T. Lobbiànum* var. *miniàtum*, Hort.), is said by some to be a hybrid with bright vermilion fls. Var. **Regìna,** Hubb. (*T. Lobbiànum* var. *Regìna*, Hort.), is a form with bright salmon-red or salmon-orange fls. There is a horticultural strain of more compact growth known as *T. Lobbiànum compàctum*; this strain occurs in numerous colors. Horticultural color-forms listed under the name *T. Lobbianum* are *atropupùreum*, dark purple; *aùreum*, clear golden yellow; *fùlgens*, dark scarlet; *Chaixiànum*, yellow, washed with red.

DD. *Plant glabrous.*

E. *Lvs. orbicular-reniform; nerves terminating in mucrons: petals mucronate.*

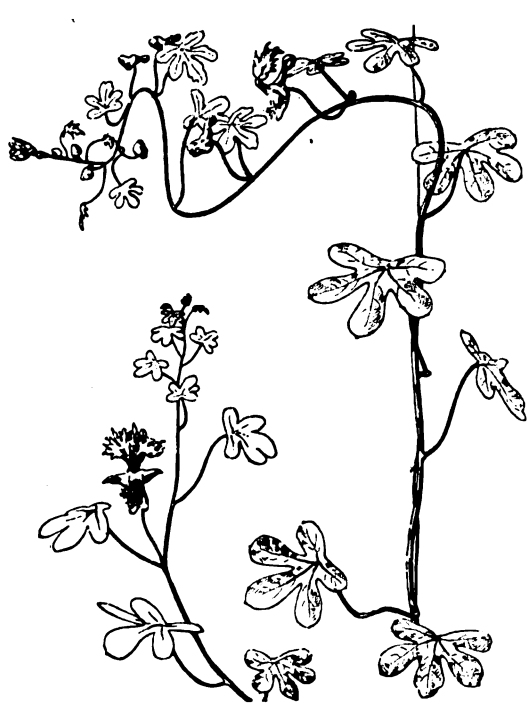
4. **minus,** Linn. Fig. 3854. Dwarf annual, not climbing, smaller in all its parts than *T. majus:* lvs. orbicular-reniform, apiculate at the ends of the veins: petals narrow and apiculate at the apex, the lower intensely maculate. Peru. B.M. 98.—Very likely blended with *T. majus* by hybridization, in garden forms. **T. pinnàtum,** Andr., is either a monstrosity of this species or more probably a hybrid between *T. minus* and *T. peregrinum*, having the lvs. somewhat peltate, with obtuse, unequal lobes: fls. pinnate; petals cuneate with the apex dentate. A garden form. Gt. 62, p. 279. The form known as *bimaculàtum*, Hort., has red petioles and peduncles and the 2 upper petals bear a dark blood-red blotch. There is also a yellow form known as *lùteum*, Hort.

EE. *Lvs. orbicular; nerves and petals muticous (blunt).*

5. **màjus,** Linn. Fig. 3855. Strong-growing somewhat succulent climbing annual: lvs. peltate, nearly orbicular and undulate-angled: fls. large, mostly in shades of yellow or orange, with straight spur, the 2 upper petals entire or undulate (not apiculate), the 3 lower ones narrower and fringed on the claws. Peru, Colombia, and Brazil. G. 4: 2. B.M. 23; 3375 (var. *atrosanguineum*). F.S. 12:1286 (var. *atropurpureum nanum*). P.M. 1:176 (var. *atrosanguineum*). G.C. II. 11:665.—This species has been in cult. in Eu. since 1684. It is the foundation of the common climbing nasturtiums. Some of these garden forms are probably the offspring of hybridization with *T. peltophorum*. Some of the horticultural color forms are *atropurpùreum*, dark red; *atropurpùreum fòliis-aùreis*, with golden yellow lvs.; *coccíneum*, scarlet and the form of it with golden lvs. known as *coccíneum fòliis-aùreis; Helnemannii*, chocolate; *hemisphéricum*, light yellow; *lùteum*, yellow; *Regelìànum*, purple-violet; *Scheueriànum*, straw-colored, dotted; *Scheueriànum coccíneum*, scarlet, striped; *Schìllingii*, yellow, brown-spotted; *Schùlzii*, scarlet, with dark lvs. Var. **flòre-plèno,** Hort., is a strain with double fls. occurring in different colors. Var. **nànum,** Hort. Tom Thumb Nasturtiums. A dwarf strain occurring in numerous color-forms, some of which are *atrococcíneum*, brilliant scarlet; *atropurpùreum*, dark purplish red; *atrosanguíneum*, a deep blood-red; *coccíneum*, scarlet and also the golden-lvd. form offered as *nànum coccíneum fòliis-aùreis; cærùleo-ròseum*, dark rose; *lùteum*, clear yellow; *Regelìànum*, purple-violet.

BB. *Petals 5, serrate-ciliate, lobed or aristate-ciliate above.*

6. **peregrìnum,** Linn. (*T. canariénse*, Hort.). Canary-bird Flower. Fig. 3856. Annual, tall-climbing; gla-



3856. Tropæolum peregrinum, the canary-bird flower. (×⅓)

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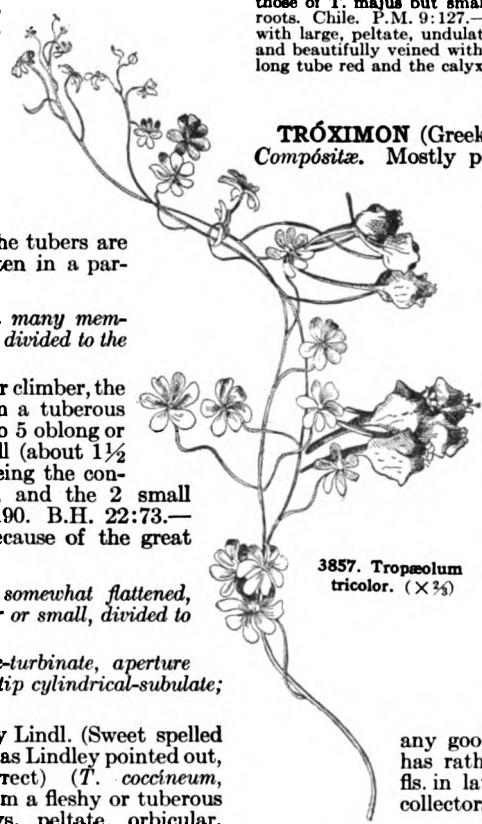
brous: lvs. peltate near the margin, cordate-orbicular, divided to about the middle into 5 lobes, which are mostly apiculate: fls. canary-yellow, odd and very irregular; spur green, hooked; 2 upper petals erect and large, obovate-clawed, much fringed; 3 lower petals small and narrow and ciliate. Supposed to be native of Peru and Ecuador. B.M. 1351. B.R. 718. G.W. 10, p. 497.—An excellent quick-growing vine, although the fls. can scarcely be called showy.

AA. *Species tuber-bearing.*

B. *Tuber large, obconical or pear-shaped.*

7. **tuberòsum,** Ruiz & Pav. Root producing a pyriform irregular tuber 2–3 in. long: st. climbing, glabrous: lvs. peltate near the base, cordate-orbicular, 5-lobed nearly or quite to the middle: fls. rather small, the calyx and long spur red, the petals yellow, small and nearly erect and little exceeding the calyx. Peru and Bolivia. B.M. 3714. F.S. 5:452. P.M. 5:49. R.H. 1853:341 (tubers). J.H. III. 30: 385. H.U. 1, p. 4.—Plant stands some frost. In Peru, the tubers are eaten, and the plant is sometimes cult. in Eu. for the tubers. It appears in the American catalogues of European dealers. The tubers are usually boiled, or said to be eaten in a partially dried condition.



3857. Tropæolum tricolor. (×⅔)

BB. *Tuber longer, moniliform in many members: lvs. in 5 parts, usually divided to the base: petals scarlet.*

8. **pentaphýllum,** Lam. Slender climber, the glabrous colored sts. arising from a tuberous root: lvs. divided to the base into 5 oblong or obovate segms. or lfts.: fls. small (about 1½ in. long), the large red spur being the conspicuous part, the lobes green, and the 2 small petals red. Argentina. B.M. 3190. B.H. 22:73.—A half-hardy species, showy because of the great number of bright small fls.

BBB. *Tuber small, sphæroid or somewhat flattened, rarely elongated: lvs. smaller or small, divided to the base.*

C. *Throat of the spur ventricose-turbinate, aperture narrow; spur cone-like, its tip cylindrical-subulate; petals lemon-yellow.*

9. **tricolor,** Sweet, emended by Lindl. (Sweet spelled the specific name *tricolorum*, but, as Lindley pointed out, this is orthographically incorrect) (*T. coccíneum*, Miers). Fig. 3857. Perennial from a fleshy or tuberous root, half-hardy, climbing: lvs. peltate, orbicular, divided into 6 oblong villous lfts.: fls. about 1 in. long, somewhat cornucopia-shaped, the calyx being the conspicuous part; main part of the calyx vermilion, the short lobes purplish, the small petals yellow. Chile. B.M. 3169. B.R. 1935. F.S. 4:369. P.M. 2:123. Gt. 62, p. 273. G.W. 6, p. 277.—Very choice half-hardy plant and probably the best known in this country of the tuberous-rooted kinds. Usually grown indoors. Its growth is very delicate. Var. **grandiflòrum,** Hort. (*T. Jarátzii*, Paxt. *T. Yarátzii*, Buchen.), differs only in having larger fls. P.M. 5:29.

CC. *Throat of spur open; spur short or very short, conical; throat of corolla narrow, almost closed when old; petals blue.*

10. **azûreum,** Miers (*T. violæflòrum*, Dietr.). Very slender glasshouse climber: lvs. peltate, 5-parted, nearly or quite to the base, into narrow-obovate or oblanceolate divisions: fls. small, the calyx and short spur green, the wide-spreading corolla azure-blue, the petals 2-lobed or emarginate. Chile. B.R. 28:65. R.H. 1843:300. F.S. 2:110. P.M. 9:247. R.B. 20:157. Var. **grandiflòrum,** Hort., has larger fls. F.S. 11:1160. I.H. 3:85.

CCC. *Throat of spur conical, aperture broad; throat of corolla broad, open; petals yellow.*

11. **brachýceras,** Hook. & Arn. A very slender climber, resembling *T. tricolor* in habit: lvs. peltate, nearly orbicular, deeply parted into 6 or 7 oblong or obovate obtuse lobes: fls. small, on short pedicels, the calyx green and very short-spurred, the corolla with spreading yellow petals. Chile. B.M. 3851. B.R. 1926. F.S. 4:368. P.M. 4:55.—Half-hardy perennial.

T. digitàtum, Karst. Climber, with root fibrous: lvs. peltate, 5–7-lobed: fls. yellow, 1 in. diam., the spur long and red, the petals fimbriate. Venezuela.—*T. leptophýllum*, Don (T. edule, Paxt.). Climber: lvs. orbicular, with 5 or 6 narrow lfts.: fls. in shape like those of T. majus but smaller, yellow. Produces tuberous edible roots. Chile. P.M. 9:127.—*T. Lindenii*, Wallis. Beautiful climber with large, peltate, undulate-lobed lvs. that are purplish beneath and beautifully veined with white above: fls. on long pedicels, the long tube red and the calyx-lobes green. Colombia. I.H. 41:17.

L. H. B.

F. Tracy Hubbard.†

TRÓXIMON (Greek, *edible*, which does not apply). *Compósitæ.* Mostly perennial nearly stemless herbs, belonging to the Cichoriaceæ, with clusters of sessile radical lvs. and simple scapes bearing a head of yellow or purple fls. in summer, on a naked or bracted stalk: involucre campanulate, the bracts in several rows: rays blunt and 5-toothed at the apex.—Species 30, in N. Amer., except possibly 2 species which are S. American. The plants are little known to horticulturists. The name Troximon is now given up for Agoseris (Greek, *goat chicory*).

Agóseris cuspidàta, Dietr. (*Tróximon cuspidàtum*, Pursh. *Nothocalàis cuspidàta*, Greene). Root thick: lvs. entire, linear-lanceolate, thickish, 4–10 in. long, the margins conspicuously white-woolly and crisped: scape about 1 ft. high: fls. yellow, about 1–1½ in. wide: achene not beaked. Prairies of Ill. and Wis. to N. D.—Cult. easy in any good border. Not unattractive. It has rather large dandelion-like heads of fls. in late summer. May be offered by collectors.

N. Taylor.†

TRUMPET-CREEPER: *Campsis*, especially *C. radicans*. **T.-Flower:** *Bignonia capreolata*. **T.-Honeysuckle:** *Lonicera sempervirens* and *Campsis radicans*. **T.-Vine:** *Campsis radicans*.

TSÙGA (its Japanese name). *Pinàceæ.* Hemlock Spruce. Hemlock. Ornamental trees, grown chiefly for their graceful habit and handsome evergreen foliage.

Resinous trees with slender horizontal branches: lvs. usually 2-ranked, short-petioled, linear, flat or angular, falling away in drying: staminate aments axillary, subglobose; ovule-bearing aments terminal, the scales about as long as the bracts, each with 2 ovules at the base: cones small, ovate, or oblong with thin flexible persistent scales, much longer than the bracts; seeds winged.—Nine or 10 species in N. Amer., E. Asia, and the Himalayas. The genus is closely allied to Abies and Picea and differs little in the structure of the fls.; the cones are very similar to those of the larch, but the lvs., which are much like those of Abies in their outward appearance, though smaller, are very different in their internal structure from all allied genera, having a soli-

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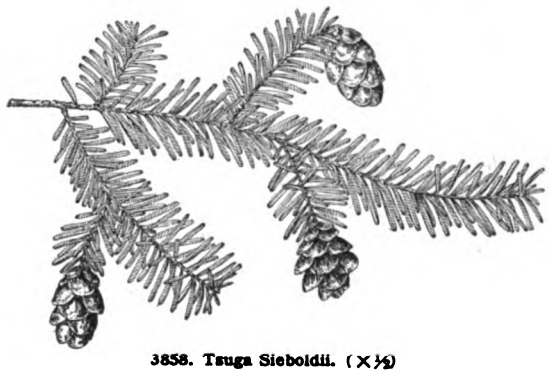
tary resin-duct situated in the middle of the lf. below the fibro-vascular bundle. The light, soft, brittle and coarse-grained wood is not durable and not much valued except that of *T. heterophylla*, which is harder and more durable, and that of *T. Sieboldii*, which is esteemed in Japan for its durability. The bark is rich in tannin and that of *T. canadensis* is extensively used for tanning



3858. Tsuga Sieboldii. (×½)

leather. *T. canadensis* should be called "hemlock spruce," but in common speech it is usually alluded to as "hemlock." The "hemlock" of the ancients is a poisonous umbelliferous herb described in this work as *Conium maculatum*.

The hemlock spruces are evergreen trees of pyramidal habit, with spreading irregularly whorled much ramified branches clothed with small linear usually two-ranked leaves and small cones which are usually freely produced. The cones are only about 1 inch long except in one species, which has cones two or three times as large. *T. canadensis* is quite hardy North and the Japanese species and *T. caroliniana* have proved hardy as far north as Ontario. *T. Mertensiana* is almost as hardy. *T. heterophylla* is tenderer. There are probably no more beautiful hardy conifers than the hemlocks, and they must be ranked among the most ornamental and useful trees for park planting. They do not have the stiff formal appearance of many of the conifers, but are graceful and stately at the same time. *T. heterophylla* is the most vigorous species and is more graceful than the Canadian hemlock, but tenderer. *T. Mertensiana* is noticeable for its light bluish green foliage and the more narrow pyramidal habit. *T. Sieboldii* is a very handsome species with dark green glossy foliage, but of slow growth and in cultivation usually remains shrubby. *T. canadensis* bears pruning well and is well suited for tall hedges (see Gng. 2:289. Gn. M. 2:15; 4:19). The other species will probably bear pruning equally well. The hemlocks are not very particular as to the soil, provided it contains a sufficient amount of constant moisture. Tsugas are not difficult to transplant. Propagation is by seeds sown in spring and by grafting on *T. canadensis*. The varieties and the Japanese species are also raised from cuttings. See also *Arboriculture*, *Abies*, and *Picea* for cultivation.

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KEY TO THE SPECIES.

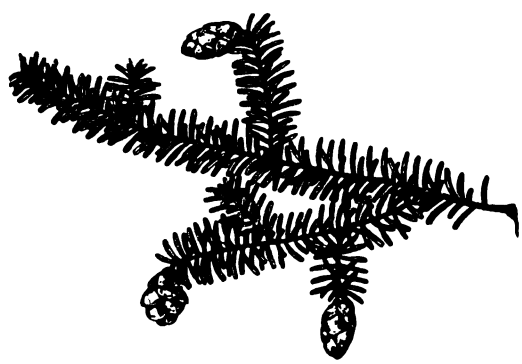
A. *Lvs. with 2 white lines beneath, grooved above, much flattened, distinctly 2-ranked: cones ½–1½ in. long.*
B. *Margin of lvs. entire; apex of lvs. usually emarginate, sometimes obtuse.*
C. *Scales of cones suborbicular.*
D. *Branchlets yellowish brown, glabrous* ..... 1. **Sieboldii**
DD. *Branchlets reddish brown, pubescent* ..... 2. **diversifolia**
CC. *Scales of cones oblong: lvs. often obtuse* ..... 3. **caroliniana**
BB. *Margin of lvs. finely denticulate, at least toward the apex; apex of lvs. obtuse or acutish.*
C. *Cones peduncled; scales almost orbicular, glabrous* ..... 4. **canadensis**
CC. *Cones sessile; scales oval, slightly puberulous outside* ..... 5. **heterophylla**
AA. *Lvs. stomatiferous on both sides, flat or convex above, spirally arranged: cones 2–3 in. long (Hesperopeuce)* ..... 6. **Mertensiana**

1. **Siéboldii,** Carr. (*T. Araràgi*, Koehne). Fig. 3858. Tree, attaining 100 ft., with spreading slender branches: branchlets pale yellowish brown, somewhat glossy, glabrous, with reddish lf.-cushions: lvs. linear, usually broadest at the apex, emarginate, grooved and glossy dark green above, with 2 whitish lines beneath, ¼–¾in. long: cone ovate, 1–1¼ in. long, the peduncle exceeding the bud-scales: bracts bifid. Japan. G.F. 10:492 (adapted in Fig. 3858). F.E. 32:1301. S.I.F. 2:4.

2. **diversifòlia,** Mast. (*Àbies diversifòlia*, Maxim. *T. Siéboldii nàna*, Carr.). Fig. 3859. Tree, very similar to the preceding, but smaller and chiefly distinguished by the reddish brown pubescent branches: lvs. linear, emarginate or obtuse, shorter and narrower, broadest at the middle or toward the base: cone smaller, ½–¾in. long: peduncle not exceeding the bud-scales; bracts truncate, crenulate, not or slightly bifid. Japan. G.F. 6:495; 10:493 (adapted in Fig. 3859). S.I.F. 2:4.

3. **caroliniàna,** Engelm. CAROLINA HEMLOCK. Tree, attaining 70 ft., of more compact habit and with darker green foliage than the following: young branchlets light reddish brown, finely pubescent or almost glabrous: lvs. linear, obtuse or emarginate, dark green and glossy above, with 2 whitish lines beneath, ⅓–¾in. long: cones oblong, 1–1½ in. long, peduncled; scales oblong. Va. to S. C. S.S. 10:604. G.C. II. 26:780. G.F. 2:269. Gn.M. 12:214.—More graceful than the following.

4. **canadénsis,** Carr. (*Àbies canadénsis*, Michx.). COMMON HEMLOCK. Fig. 3860. Tree, attaining 70 and



3859. Tsuga diversifolia. (×½)

occasionally 100 ft.: young branchlets yellowish brown, pubescent: lvs. linear, obtuse or acutish, dark green and obscurely grooved above, with 2 whitish lines beneath, ¼–⅔in. long: cones ovoid, ½–¾in. long, peduncled; scales almost orbicular. New Bruns. and Wis., south to Ala. S.S. 10:603. G.C. III. 48:350. Gn.M. 12:215. J.H. III. 66:467. G.W. 1, p. 359; 5, p. 536; 9, p. 213.—The hemlock spruce yields the lumber

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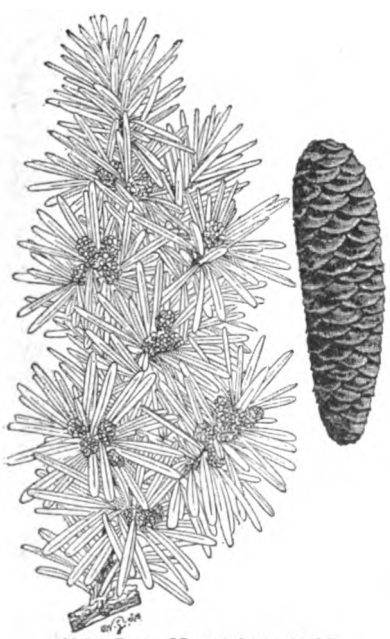
most commonly used in the E. for framing and clapboarding of buildings. It is not used for finishing lumber. A number of garden forms have been raised; the following are the most important: Var. **álbo-spíca,** Nichols. Tips of the young branchlets creamy white. Var. **compácta,** Sénécl. (var. *compácta nàna,* Beissn.). Dwarf conical pyramid with numerous short branchlets clothed with small lvs. Var. **globòsa,** Beissn. (var. *globulàris erécta,* Kunkler). Dense, globose, much-branched form with numerous upright branches nodding at the ends. Var. **grácilis,** Gord. (var. *microphýlla,* Hort.). Slow-growing form with slender sparingly ramified branches, spreading and more or less drooping at the ends: lvs. very small, about ¼in. long. Var. **nàna,** Carr. Dwarf and depressed form with spreading branches and short branchlets. Var. **parvifòlia,** Veitch. Lvs. very small, ¼in. long or shorter: branchlets stout, closely set and numerous. Var. **péndula,** Parsons (var. *Sárgentii péndula,* Hort., var. *Sargentiàna,* Kent). Flat-topped form with spreading branches and drooping branchlets. Gn. 32, p. 363; 39, p. 81. M.D.G. 1900:367, 368, 491. Very distinct and desirable form.

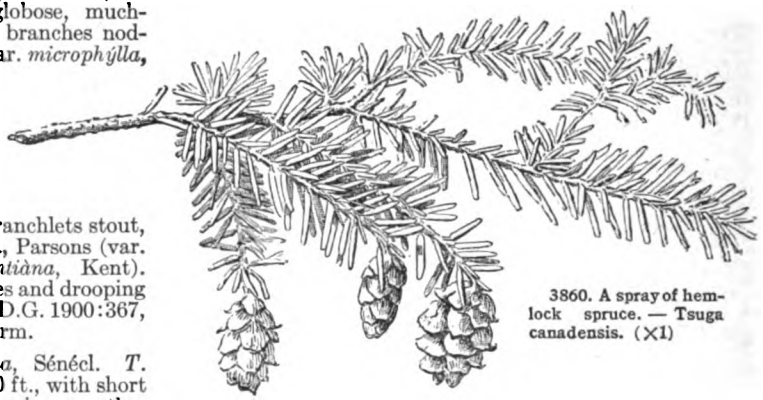
5. **heterophýlla,** Sarg. (*T. Albertiàna,* Sénécl. *T. Mertensiàna,* Carr.). Tree, attaining 200 ft., with short slender, usually pendulous branches forming a rather narrow pyramidal head in older, but rather broad in young trees: young branchlets pale yellowish brown, pubescent: lvs. linear, obtuse or acutish, distinctly grooved and dark green above, with 2 white lines below, ½–¾in. long: cones oblong-ovoid, sessile, ¾–1 in. long; scales oval, slightly puberulous outside. Alaska to Calif., west to Mont. S.S. 10:605. G.C. III. 12:11. Var. **argénteo-variegàta,** Schneid. Tips of the young branchlets white.

6. **Mertensiàna,** Sarg., not Carr. (*T. Pattoniàna,* Sénécl. *T. Hookeriàna,* Carr. *T. Roèzlii,* Carr. *Àbies Williamsonii,* Newb. *Hesperopeùce Pattoniàna,* Lemm.). Fig. 3861. Tree, attaining 100 and occasionally 150 ft., with slender pendent branches usually forming an open pyramid: young branchlets light reddish brown, pubescent, usually short and upright: lvs. spirally arranged around the branches, linear, usually curved, acutish, mostly rounded or keeled, rarely slightly grooved above, light bluish green or pale bluish white, with whitish lines on both sides, ½–1 in. long: cones cylindric-oblong, usually violet-purple before maturity, brown when ripe, 2–3 in. long; scales obovate, puberulous outside. Brit. Col. to Calif., west to Mont. S.S. 10:606. G.C. III. 12:10; 13:659; 21:150, 151 (adapted in Fig. 3861). G.F. 4:380; 10:6, 7. R. H. 1870, p. 21. Var. **argéntea,** Schneid. Foliage bluish white. G.W. 14, p. 602. Var. **Jéffreyi,** Schneid. (*T. Pattoniàna* var. *Jéffreyi,* Henry). Lvs. greenish, flattened and grooved above.—To avoid confusion one has to bear in mind that *T. heterophylla* was known for a long time as *T. Mertensiana* and still bears this name in many gardens.



3861. Tsuga Mertensiana. (×½)

T. chinénsis, Prits. Tree, to 120 ft.: branchlets yellowish gray, pubescent: lvs. ½–1 in. long, rounded or emarginate at the apex, green or nearly so beneath, entire, on young plants sparingly toothed and with narrow white lines beneath: cones sessile, about 1 in. long, lustrous. Cent. and W. China. G.C. III. 39:236 (cones, as T. yunnanensis). Has proved hardy at the Arnold Arboretum and thrives well.—*T. dumòsa,* Sarg. (T. Brunoniana, Carr.). Tree, to 120 ft.: lvs. gradually tapering from the base, serrulate, acutish, with broad silvery white lines beneath, ¾–1¼in. long: cone 1 in. long. Himalayas. G.C. II. 26:73, 501. Tender.—*T. Frétzii*=Pseudotsuga taxifolia var. Fretzii.—*T. yunnanénsis,* Mast. Tree, to 150 ft.: branchlets with rufous-gray pubescence: lvs. rounded at the apex, entire, with white lines beneath, ½–1 in. long: cones ¾–1 in. long, dull, with fewer scales than T. chinensis. W. China. G.C. III. 39:236 (excl. cones). Growing at the Arnold Arboretum, and apparently quite hardy.



3860. A spray of hemlock spruce. — Tsuga canadensis. (×1)

ALFRED REHDER.

TSUSIOPHÝLLUM (*Tsusia,* a subdivision of Rhododendron, and Greek for *leaf*). *Ericàceæ.* A low prostrate shrub, native of Japan, resembling small-lvd. rhododendrons of the section Tsusutsi (Tsusia), like *R. Tschonoskii,* but corolla tubular, regular, smaller, anther-cells dehiscent with a longitudinal slit, ovary 3-celled and the scales of the winter buds dropping from the base. Recently intro. and probably as hardy as *Rhododendron Kaempferi.* Cult. and prop. like other alpine Ericaceæ. **T. Tanákæ,** Maxim. Low prostrate shrub with setose branchlets: winter buds with the outer scales longer than the inner ones: lvs. obovate-elliptic, acute and apiculate, setose above, glabrous and glaucous below except the setaceous midrib, ⅓–½in. long: fls. 1–2, short-stalked, white or pinkish; calyx-lobes ovate, obtuse; corolla scarcely ⅔in. long, tubular with short roundish spreading lobes, the tube pubescent outside and inside; stamens not exceeding the tube, style shorter than the stamens; ovary paleaceous-setose. Cent. Japan.

ALFRED REHDER.

TUBEROSE: *Polianthes.*

TULBÁGHIA (Tulbagh, a Dutch governor at the Cape of Good Hope, died 1771). *Liliàceæ.* Perennial herbs with a short thick woody sometimes corm-like rhizome, usually grown in the greenhouse: lvs. radical, ligulate: scape simple, leafless: fls. in a terminal umbel, numerous, pedicellate; perianth urn-shaped or almost salver-shaped; lobes 6, subequal, spreading; crown rather fleshy at the throat, shorter than the lobes; stamens 6; ovary sessile, ovoid or subglobose, 3-celled: caps. ovoid or oblong, loculicidally dehiscent.—About 20 species, Trop. and S. Afr. Greenhouse subjects, little cult.; prop. by seeds and offsets.

Símmleri, Beauverd. Bulb ovoid: lvs. lorate-lanceolate, rather obtuse: scape much longer than the lvs.: fls. small, rose, segms. ovate-oblong; corona urn-shaped, crenately 3-lobed. Transvaal.

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TULIP: *Tulipa.* **T., Butterfly:** *Calochortus.* **T., Cape:** species of *Hæmanthus.* **T. Poppy:** *Hunnemannia.* **T. Tree:** *Liriodendron;* also *Hibiscus* (or *Paritium*) *elatus.*

TÙLIPA (originally from Persian *toliban*, turban; which the inverted flower resembles). *Liliàceæ.* TULIP. Popular spring-flowering hardy bulbs, and much used for forcing; of easy culture.

Low plants, the fls. mostly single (sometimes 2–5) on a scape or scape-like peduncle that arises directly from the bulb and is 30 in. or less high: bulb tunicated, the outer tunic often hairy or woolly on the inner face: lvs. linear or broad: fls. erect, rarely nodding, showy; perianth deciduous, campanulate or slightly funnel-shaped; segms. distinct, often spotted or blotched at base, without pitted nectaries; stamens 6, hypogynous, shorter than perianth-segms.; filaments longer or shorter than anthers, attenuate or filiform; anthers dehiscing laterally; ovary sometimes narrowed at collar, rarely into a distinct style; stigmas adnate: seeds numerous, flat. Differs from Fritillaria in the absence of nectariferous pits and usually erect (never pendulous) fls., and from Erythronium in its erect broader perianth-segms., erect fls., and usually 1-fld. sts. Native of Siberia, Turkey, Asia Minor, China, Japan, and Medit. countries of Eu.; the species are particularly abundant in Cent. Asia, in the Bokhara region. The genus includes probably 100 species as usually defined but perhaps reducible to much fewer; the number in cult., outside the collections of specialists and botanic gardens, is very few. For literature, see J. G. Baker, Journal Linnean Society xiv. (1875), 275–96; also in Gardeners' Chronicle, for 1883 (vols. 19 and 20); Levier, "Les Tulipes de l'Europe," 1885; Solms-Laubach on the history of the garden tulips (see his "Weizen und Tulpe, und deren Geschichte," Leipzig, 1899); Burbridge, The Garden, Sept. 22, 1900.

3862. A garden tulip. (×½)

Tulips are flowers of rich and brilliant colors, and of good "substance." The tulip is the most showy of spring flowers, and the habit and shape of the plant are so formal and definite that it is adapted to the vicinity of buildings, walks, and to parterres. They are also charming subjects for "spotting in" singly and in little clumps among shrubbery and along well-planted borders.

The range of season is great, from the early Duc Van Thols to the Cottage and late Darwins, covering nearly two months. By a judicious selection of seasons and colors, the amateur may have a most satisfactory successional display, one kind blending into the other. The catalogues of plantsmen and seedsmen usually contain reliable lists of varieties for the different seasons. They are dwarf, from about a foot high in the early races, to very tall, as much as 2 and 3 feet in some of the Darwins and other month-later races. There are double tulips of good form and many colors; also the Parrot tulips with curiously enlarged and cut or frayed petals and odd color-markings. The graceful chalice-lines of the single tulips are lost in the double and semi-double forms; the doubles, however, make striking mass displays; they are usually somewhat later-blooming than the singles of the same class.

The form of the chalice or perianth-cup, the substance of the flower, the shape of the segments, and the color, are marked features in the tulips of the different classes and seasons. The usually cultivated tulips have very broad flower-segments, obtuse or abruptly narrowed and short-pointed, as in Fig. 3862. In the wild, however, are many forms with long-narrowed segments, as shown in Fig. 3863 (adapted from Gardeners' Chronicle), and these may be seen sometimes in the gardens of amateurs; they are very interesting and often showy. It appears that in earlier times the sharp-pointed flower-parts were desired. Other tulip forms are represented in Figs. 3864 and 3865, as well as in the succeeding pictures accompanying this article.

The colors of tulips cover a wide range except that there are no real blues. There are clear whites, yellows and orange, crimsons and reds, violets and purples, and many vari-colored types. The tulips known as "breeders" are self-colored kinds; that is, the flowers are of solid colors, usually in dull and neutral shades of red and yellow with tints of bronze, buff, and brown. The reason for the name is this: When tulips are grown from seeds, the flowers at first are usually self-colored; the same bulbs when grown for a few years tend "to break" into mixed colors, particularly into feathered markings: the self-colored state is a breeding-stage for other kinds. When the bulbs are multiplied asexually (as explained farther on), they reproduce the stage in which they then are; if propagated in the "breeder" stage, they give self-colored flowers; if in the "broken" stage, they give parti-colored flowers. These stages are longer or shorter in different lots of seedlings, and are not definite epochs. The "broken" tulips are of many kinds. Those with white ground or under-color and lilac or purple markings are "bybloemen" or "bybloems," and those with yellow ground-color and red to brown over-color are "bizarres." The terms "bybloem" and "bizarre" are also sometimes applied to selfs, or breeders, when the colors are prevailingly lilac or purple in the one case or prevailingly yellow in the other. Selected strains of breeder tulips, with very large bloom, long stems, and "art colors" are now popular. The so-called "rectified" tulips are broken breeders with solid colors in stripes, flames, plumes, and patches; they are bybloemen and bizarres. It is said that the "breaking" is facilitated by certain soils.

3863. A tulip with acuminate flower parts.

There are many classes of tulips. We might distinguish three roughly: (1) The early single tulips of the Duc Van Thol kind, of small stature, excellent for first bloom and for early bedding, being out of the way for other bedding plants; they lack the size of bloom and the "substance" of later kinds. There are also later-flowering single tulips of the early class. (2) Later-flowering or Cottage tulips, comprising the main-season kinds that have been preserved by cottagers in the old countries since the collapse of the tulipomania of Holland. (3) The Darwins are stately plants, mostly selfs or "breeders," closing the tulip season, with very rich and deep colors in crimsons, reds and purples; there are

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some whites but no yellows. This Darwin race is relatively recent, having been given its present name (in compliment to Charles Darwin) little more than twenty-five years ago. Broken rectified Darwins in several color combinations are known as Rembrandt tulips.

There are many other classes or subclasses, and races of intermediate season, that need not be mentioned here.

Vari-colored garden tulips are classified by F. D. Horner (England) into six main sections or classes, and the self-colored or "breeder" strains into three classes, as follows: "(1) *Flamed Bizarres.* These have a yellow ground flamed with red, very dark, almost black, and chestnut-brown. (2) *Feathered Bizarres.* These have similar colors, but the yellow grounds are marked or penciled on the margin, whereas the flamed flowers have a heavy 'beam' of color in the center of the petals. (3) *Flamed Bybloemens.* These have a white ground marked with lilac, purple, and very deep black-purple color. (4) *Feathered Bybloems.* Similar in color, but with feathered instead of flamed petals. (5) *Flamed Roses.* These are flamed with rose and scarlet colors on the pure white ground. (6) *Feathered Roses.* These have a white ground, and are flamed with rose and scarlet colors. There are three more classes of what are termed 'breeders.' *Bizarres.* Yellow selfs. *Bybloemens.* Lilac and light to deepest purple selfs. *Roses.* Rose and scarlet selfs. They are termed 'breeders' because in the course of a few years these self-colored flowers become flamed or feathered, and pass out of the breeder state."

3864. The common contemporaneous garden tulip.

The common garden tulips, in their many forms, are probably all developments of the Gesneriana group, comprising *T. Gesneriana*, *T. suaveolens*, and the like. Many of the forms sometimes catalogued as "botanical tulips" are also very ornamental and are always interesting in a collection. A number of species may be had in the trade. They should be better known.

3865. Acute-petaled style of tulip. (×¼)

Tulip history (Stubenrauch).

The tulip has an unusual and interesting history, on which we may pause briefly.

The origin of the garden tulip seems to be lost beyond recovery. It is often said that it is derived from *Tulipa Gesneriana*, but this does not explain. It merely means that in 1753 Linnæus grouped all the garden tulips he knew under the name of *Tulipa Gesneriana*. But the tulips of that day had been cultivated for two centuries by Europeans, and previously for an indefinite period by the Turks, from whom, of course, we have no exact records. (Fig. 3866.) One might study wild tulips in their native places and compare them with descriptions without being certain of the original form which the Turks brought from the wild, simply because of the lack of records at the beginning. It is necessary to have some scientific name for the garden tulips. The most one dare say is that the garden tulips are chiefly referable to *T. Gesneriana* and *T. suaveolens*, with the distinct understanding that these names do not represent an original wild stock. *Tulipa suaveolens* requires explanation. This name, which dates from 1797, stands for a kind of tulip discovered wild in southern Europe long before that date. There is no proof that it was native; the probability is that it had escaped from gardens and run wild. In 1799, it was distinguished from the other tulips then known by the fragrance of the flowers, the earliness of bloom, slightly greater size and pubescent scape. From the early records it appears that there were fragrant early-blooming flowers among the first tulips received from Turkey. This is one of the main reasons for thinking that *T. suaveolens* is not native to southern Europe. At all events, it is clear that *T. suaveolens* has played an important part in the evolution of the garden tulip, the Duc van Thol class being credited to this source. The distinctions between *T. suaveolens* and *T. Gesneriana* given in the sequel are those of Baker, but they do not hold at the present day. It is impossible to refer any given variety with satisfaction to either type. Some writers have said that the leaves of *T. suaveolens* are shorter and broader than those of *T. Gesneriana*. This character also fails. All grades of pubescence are present. Some pubescent plants have long leaves and odorless flowers. Others have short glabrous leaves and fragrant flowers.

For practical purposes it may be said that most of the common garden tulips, at least the late-flowering ones, are *T. Gesneriana*, while many of the early-flowering kinds, e.g., the Duc van Thol class, are supposed to be derived from *T. suaveolens*. It is impossible to press much nearer the truth, as the prototypes of the old garden favorites cannot be known completely and precisely.

The first tulip seeds planted by Europeans were sent or brought to Vienna in 1554 by Busbequius, the

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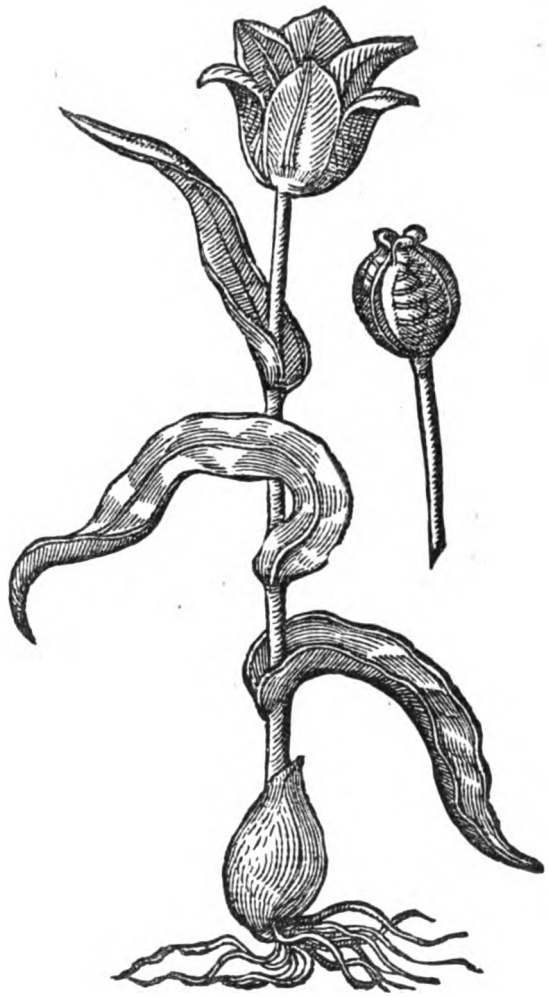
Austrian ambassador before the Sultan of Turkey. Busbequius reported that he first saw the flowers in a garden near Constantinople, and that he had to pay dearly for them. After the introduction of seed to Vienna the tulip became rapidly disseminated over Europe, both by home-grown seed and by new importations from Turkey. In 1559 Gesner first saw the flower at Augsburg, and it is mainly on his descriptions and pictures that the species *T. Gesneriana* was founded. One of the earliest enthusiasts was the herbalist Clusius, who propagated tulips on a rather large scale. A picture from him is shown in Fig. 3866. He did not introduce the tulip into Holland, but the appearance of his specimens in 1591 did much to stimulate the interest in the flower in that country. The best of Clusius' plants were taken from him, as the admirers of the tulip were unwilling to pay the high prices he demanded. After this, the propagation of the tulip proceeded rapidly in Holland and the flower soon became a great favorite. The production of new varieties became a craze throughout the Netherlands, culminating in the celebrated "tulipomania" which began in 1634. The excitement continued for four years, the price of bulbs often being above that of the precious metals. Thirteen thousand florins were paid for a single bulb of Semper Augustus; but the dealings were often in the nature of pure speculation, no bulbs changing hands. Governmental interference was necessary in order to end the ruinous speculation. After the craze subsided, the production of varieties continued upon a normal basis, and has persisted throughout the centuries in Holland, making that country the center of the bulb-growing industry of the world down to the present day.

The introduction of the tulip into England is credited to Clusius, about the year 1577. Tulips reigned supreme in English gardens until the beginning of the eighteenth century, when they were neglected by the rich for the many new plants from America. For a time the tulip was considered more or less of a poor man's flower, although it has at no time been without many staunch admirers among the upper classes.

With the Turks the narrow acuminate flower-segments were in favor, while western taste preferred the rounded forms (Fig. 3868). The Turks seem to have been satisfied with a preponderance of thé reds and yellows, for in the first sowings of Turkish seeds the larger part of the resulting blooms were of those colors. It thus came about that flowers so colored were considered common and undesirable in the European gardens and all effort was directed to the production of the rarer white-grounded varieties with finely and distinctly marked stripes, those with a sharp bright red being the favorites. Indisputable evidence of this is seen in the old Holland "still-life" paintings of that time, where one finds none but the rarer forms represented (Solms-Laubach). All the early tulips of direct Turkish origin had acute more or less narrow and reflexed segments. Indeed, among all the old engravings, including those of Pena and Lobel (1570), Clusius (1576), Dodoens (1578), and Besler (1613), no round-petaled forms are found. Besler's work, "Hortus Eystettensis," contains magnificent copper plates, the first in any book on plants. In some copies the plates are beautifully colored by hand. The fifty-three figures of tulips in this great work show how widely diversified was this flower even at that early date. In this and in Parkinson's "Paradisus Terrestris" (1629), many are figured with inner segments rounded and outer acute, but none vice versa (so far as can be seen), although that form is mentioned in the descriptions. The broad, rounded, erect-petaled forms were developed later, apparently first by the Dutch growers before the tulipomania and contemporaneously with it, and produced wholly by selection. This ideal has prevailed down to the present time, for the narrow-petaled varieties are practically unknown among our common garden forms, so much so that the extreme typical one has been referred to a separate species (*T. acuminata*, Fig. 3872). In the Dutch fields they are now known as "thieves," and are destroyed as soon as they make their appearance. The quest for unusual colors appears to have been one feature of the tulip furore. Dumas' "Black Tulip" is interesting in this connection.

Parrot tulips were known toward the end of the seventeenth century. They were often considered



3866. A sixteenth-century tulip.
From the work of Clusius published in 1576. One of the oldest pictures of tulips. Same size as original plate.

to be monstrosities and were pictured as such. According to Solms-Laubach, no traces of them are to be found in the old Dutch books. They were evidently developed by the French, who did not disdain the yellow and red forms, to which these belong, to such an extent as did the Hollanders. At one time they were made a separate species, *T. turcica*, and were later said by one author to be hybrids, between *T. acuminata* and *T. sylvestris* (E. S. Rand, Jr., 1873), by another between *T. Gesneriana* and *T. suaveolens* (Mrs. Loudon, 1841). That the Parrot tulips are hybrids is perhaps true, but to state with certainty the parents seems impossible, for as early as 1613, among the figures in Hortus Eystettensis, there is one which shows laciniation of the petals to a marked degree, sufficiently so, in fact, to be

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the original form from which this strain might have been developed. Many of the garden varieties of today exhibit more or less laciniation, so that it is probable that "Parrot" strains might be developed from them by simple selection.

Double tulips seem to have made their appearance at an early date. In "Hortus Eystettensis" (1613), there are four forms figured, one of which, at least, seems to have been almost wholly made up of bracts, as it is shown entirely green and is described as being "wholly herbaceous and green." The other three there figured

3867. A pan of Murillo tulips, one of the few double varieties that are really desirable. (×¼)

are: one red, one yellow, and the other white with maroon borders. Solms-Laubach places the advent of double tulips at a much later date, 1665, and gives as the first authentic record the account of "*Tulipa lutea centifolia, le monstre jaune double.*" Flowers with as many as 200 petals are mentioned. A double form of "*T. serotina*" was known in 1701, and at the beginning of the nineteenth century a double form of *T. sylvestris* was described.

Cultivation of the tulip.

The tulip is one of the easiest plants to grow, but, like other plants, it profits by extra care. In any ordinary soil it gives excellent satisfaction, if good bulbs are secured in the first place.

For outdoor cultivation for spring bloom the bulbs should be set in September to December in the latitude of New York. They should be planted before hard freezing weather comes. The soil should be a sandy loam, well worked to a depth of at least 12 inches for best results, and enriched with leaf-mold and well-rotted cow-manure. Fresh manure of any kind should never be used near bulbs of any sort. On heavier soils tulips can be successfully raised if extra care is given to insure perfect drainage. Drainage is important under all conditions. The bulbs will never prove satisfactory in low wet situations, and if there is danger from standing water it is best to raise the beds several inches above the surrounding ground. The production of large perfect flowers depends on a large supply of fibrous roots. Size of bulbs is not so important: a large bulb cannot offset a deficiency of roots.

Plant the bulbs 4 to 6 inches deep (to the bottom of the bulbs) and 4 to 9 inches apart, depending on the class or size of the plants, the closer distances being for the early single kinds and the wider distances for the later and larger kinds. Care should be exercised to place all the bulbs at the same depth, as otherwise they will not all bloom at the same time. When the ground begins to freeze, cover the beds with leaves, dry forest litter, or other light material. After danger of heavy frosts is past in spring the beds should be uncovered, and if the work of preparation and planting has been well done the tulips will require little or no further care. In England many of the beds of choice and delicate varieties of tulips are protected when in flower from heavy rains and hot sun by means of light cloth screens, and are thus kept in good condition for some time.

Tulips may remain in the ground several years if the tops are not cut off and if the maturing leaves are not smothered by other plants. In practice, however, the best results are usually not secured in this country after the bulbs have been in the ground two or three years. The Darwin class seems to lack in constitution, and the plants should be renewed every two years or so.

In old-fashioned gardens, tulips often remain year after year; but when the beds are needed for other flowers in succession, the bulbs are lifted as soon as the flowers are past and reset elsewhere until the plants mature and the tops die down naturally. Then the bulbs are taken up, sorted and dried, and stored in a cool dark place until planting-time; or they may be planted at once in the permanent quarters if the area is ready to receive them. Even in borders and among shrubbery, it is well to take up the bulbs every two or three years and sort out the small ones, replanting the remainder; or, if they are weak, to discard all of them for new ones. For the best bedding work, it is advisable to use strong freshly imported stock each year.

To make design-beds, choose bulbs of very uniform size. Dig out the bed, removing all the earth a little deeper than the bulbs are to be planted, then make a thin layer of soft earth on which the bulbs may rest; this surface should be stroked level and be at a uniform depth. Then place the bulbs in the design and fill in around them carefully by hand; then place the earth back in the bed.

For pot culture (winter and spring bloom), a mixture of fine garden loam, two parts to one of well-rotted manure (cow-manure composted for two years is best), mixed with enough clean sand to make the mass easily friable, is most suitable. If no loam is obtainable and a heavier garden soil must be used, one part of the latter will be sufficient, in which case the addition of an equal proportion of leaf-mold will be advantageous. From three to five bulbs, according to size, to a 5-inch pot are effective. Deep pans are often used with good effect; a 6-inch pan may hold five or six early singles, and an 8-inch pan as many as ten (Figs. 3867, 3868). Fill the pots lightly and press the bulbs into the soil, thus bringing the base in close contact with the soil-particles. Cover the bulbs to the tip and press the soil firmly all around. Water once freely and cover the pots entirely with soil, leaves, or litter, so that they will be out of reach of frost, or place them in a dark cold (not freezing) cellar or room until the bulbs have become well rooted, which under ordinary conditions will re-

3868. Round-petaled tulips in a 5-inch pot. (×¼)

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quire five or six weeks. When the pots have become well filled with roots—the more the better—they are ready to be brought into the house. For the first few days at least the temperature should be moderate and even, and the atmosphere not too dry. Water freely but not to excess. Some of the varieties—especially the white thin-petaled ones—are said to resent overwatering very quickly. If raised in living-rooms greater care is necessary, as the atmosphere of such a room is drier than that of a greenhouse. On cold nights the plants should be removed from exposed places where they are liable to freeze, and when the flowers appear they should not be allowed to stand in the direct rays of the sun shining through a window. Many of the handsomest flowers are thus easily burned and wilted. Practically all of the early single varieties are adapted to pot culture, especially the Duc van Thols when well rooted; otherwise they are extremely unsatisfactory. For a succession, pot every week or ten days from September to December or pot early and bring into the house at fortnightly intervals. Avoid caking the soil beneath bulbs. The single early tulips are best for forcing, although some of the Darwins give good results.

3869. Three leafy bulb-scales from young bulb, exhibiting the homology of leaves and bulb-scales (×½). At the right an old tulip bulb, showing formation of new bulb within the old, and flower-stem attached directly to root-crown.

Many of the early single varieties are adapted to water-culture. For this purpose use ordinary "hyacinth glasses" and select only well-formed solid perfect bulbs of fair size. Put a little charcoal in the water to keep it pure. The bulbs must be placed so that the base is just in contact with the water—not immersed in it. Place them in a dark closet for ten days or a fortnight until the bulbs have become well rooted, then give them plenty of light and air.

Propagation is effected in various ways. Tulips may be increased by the side offsets, but these are not so constant as new bulbs produced within the outer tunics by means of cutting the old bulbs. Fig. 3869 shows a section of a bulb with new inner bulb and outer offset in place. The new bulb is completely inclosed in a sac which afterward becomes the outer dry membranous tunic. The pubescence, if any, may be found on the inside of this sac, even in the earliest stages of growth. The new bulb is attached to the base of the flower-stem, immediately above the root-crown from which the former proceeds directly upward. Each new bulb-tunic (including the outer sac) is provided with a growing tip, which often extends above ground into a leaf, each one coming up within the other. Fig. 3869 shows the separated leafy bulb-scales, and indicates the homology of tunics and leaves. Sports among the offsets are at present mainly depended on for the production of new varieties. These have been found susceptible to the "breaking" process, though perhaps slower to respond than the seedlings. Seed production is now practised only in exceptional cases. The production of hybridized varieties by crossing the old forms with some of the newly introduced species is likely to come into favor.

Tulips are "Holland bulbs;" that is to say, the bulbs are grown mostly in Holland and are extensively shipped to this country. Considerable interest has been aroused in the growing of commercial bulbs in this country, particularly in the Puget Sound region. The tulip can be grown to perfection in the Pacific Northwest, but the cost of production, on account of the high wage-rate, may be a controlling problem. As the situation looks now, the American can produce fully as good a bulb, and one that will mature earlier than the Holland-grown; but whether the product can be sold in the eastern market in competition with the Dutch is a question yet to be determined. It is probable that the bulbs can be grown as far south as San Francisco. South of San Francisco, the single early tulips bloom very close to the ground; on the other hand, the Darwins seem to do very well in the Santa Cruz and Ventura regions. At the government bulb-farm at Bellingham, Washington, good tulip bulbs with normal increase have been produced under adverse conditions.

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KEY TO THE GROUPS.

It is a matter of regret that the key used below is based on technical botanical characters of no interest to the horticulturist, but it seems to be impossible to group the species primarily according to the color and shape of the flowers or other marked external features. It is difficult to determine the cultivated forms botanically. For the most part, the portraits cited in this treatment are under the names that accompany them; the authors can not vouch for all of them.

Subgenus I. ORITHYA. *Style distinct by the attenuation of the ovary, bearing 3 small stigmas: dwarf, small-fld. and fragile plants little known in cult.* Species 1

Subgenus II. TULIPA proper. *Style lacking, the stigma sessile on the ovary.*

A. *Outer coat or tunic of bulb glabrous or practically so inside.* Species 2–4

AA. *Outer bulb-coat or covering variously hairy on inside.*

B. *Bulb-tunic always hairy at base inside around root-crown, and usually with a few scattering hairs above but sometimes without them.* Species 5–13

BB. *Bulb-tunic with a few appressed hairs inside toward the top.* Species 14–23

BBB. *Bulb-tunic with scattering appressed hairs all over inside.* Species 24–38

AAA. *Outer coat variously pubescent or woolly inside.*

B. *Bulb-tunic pubescent inside, often densely so at apex.* Species 39–42

BB. *Bulb-tunic woolly at base inside.* Species 43–47

BBB. *Bulb-tunic everywhere woolly inside.* Species 48–53

Subgenus I. ORITHYA, *small plants with a distinct style.*

1. **dasystèmon,** Regel (*Orithya dasystèmon*, Regel). "Belongs to the Orithya section of the genus, which

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includes species that are nearly all of small stature and possess comparatively small fls. It is a charming plant, growing about 6 in. high. The fls. have yellow segms. edged with white. When fully open in sunny weather a group produces a brilliant effect, and it is one of those small bulbous plants that are most appropriate for the rock-garden planted between other low-growing plants. The bulbs may be left undisturbed in the ground; a group planted amongst *Alyssum spinosum* in the rock-garden at Kew flowered quite as freely the second year as the first."—W. I. in G.C. III. 52:206 (with fig.). Baker describes it as st. 1-fld. and not more than 3 or 4 in. long: lvs. 2, glaucous, lanceolate: perianth above 1 in. long, funnel-shaped, bright yellow inside, the outer segms. oblanceolate and green-tinged on outside. E. Turkestan.

Subgenus II. TULIPA proper, *without distinct style.*

A.1. *Outer bulb-tunic quite or nearly glabrous inside.*

B. *Perianth yellow, flushed with green outside* ..... 2. **fragrans**
BB. *Perianth crimson tinged with yellow outside* ..... 3. **Hageri**
BBB. *Perianth vermilion* ..... 4. **præstans**

2. **frágrans,** Munby. Height 6–12 in.: proper lvs. 3, crowded at middle of st., linear or lorate: fls. yellow, greenish outside; perianth funnelform-campanulate, 1–1½ in. long, 3 in. across, slightly fragrant; segms. all acute; filaments bearded at base; ovary slightly narrowed at collar; stigmas small. Algeria. Gn. 45:486.—Allied to *T. sylvestris,* differing in position of the lvs. and segms. uniformly wide.

3. **Hágeri,** Heldr. Height 6 in.: lvs. 4–5, lorate acute, not undulate: fls. chiefly red, about 2 in. across; perianth broad-campanulate, 1¼ in., inodorous; segms. acute, red, with a large, green or purple-black basal blotch margined with yellow; stamens purple-black; filaments linear, bearded at base; ovary narrowed at collar; stigmas small. Hills of Parnes range in Attica. B.M. 6242. F. 1877:169. Var. **nítens,** Hort. Wallace. Said to be much finer than the type: fls. 3 in. across, bright orange-red, the outer segms. flushed with gray and bronze, black at base. Asia Minor. Gn. 63, p. 372.

4. **præstans,** Hoog (*T. suavèolens* var. *sylvéstris,* Regel). Bulb about 1 in. diam., rounded, with leathery skin which is almost glabrous inside: scape to 18 in., white-hairy, 1- to several-fld.: fls. light scarlet-vermilion, the segms. all uniform in shape, pointed: lvs. hairy, rather broad. Bokhara. B.M. 7920. G.C. III. 33:325. Gn. W. 24:317.—Once confused with *T. suaveolens,* but now considered to be clearly distinct, and that species is identified with the Duc van Thol forms.

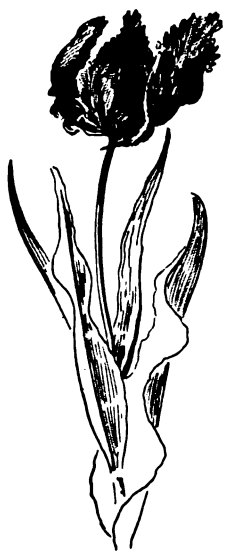
A2. *Outer bulb-tunic always hairy at base inside around root-crown, and usually furnished with a few scattering hairs above but sometimes without them.*

B. *St. and lvs. pubescent* ..... 5. **suaveolens**
BB. *St. and lvs. glabrous* ..... 6. **strangulata**
C. *Leafy only at base of st.*
D. *Lvs. lanceolate: fl. yellow* ..... 7. **australis**
DD. *Lvs. linear: fl. yellow* ..... 8. **primulina**
DDD. *Lvs. lorate-lanceolate: fl. greenish.* 9. **viridiflora**
CC. *Leafy to middle of st. or above.*
D. *Perianth uniformly dark scarlet with a bright yellow basal blotch.* 10. **fulgens**
DD. *Perianth uniformly with a blackish basal blotch, bordered with bright yellow* ..... 11. **macrospeila**
DDD. *Perianth variable, but rarely with a bordered dark basal blotch* ..... 12. **Gesneriana**
13. **nitida**

5. **suavèolens,** Roth. DUC VAN THOL TULIPS. Height 3–6 in.: lvs. 3–4, mostly at base of st., lowest lorate-lanceolate and broad: perianth campanulate, 1–2½ in. long, erect, fragrant, bright red or yellow or variegated; segms. all acute; filaments glabrous; anthers yellow; ovary prismatic; stigmas very large. S. Russia and S. Eu., but possibly only a naturalized form of old intro. Turkish garden varieties. F.S. 12:1223. B.M. 839. Var. **plurifòlia,** Hort. St. with 2 fls., bright scarlet, rather pointed in form, with black mark at base of each segm.

6. **strangulàta,** Reboul. Said by Baker to be very near *T. suaveolens,* but much taller and the segms. furnished at base with a large black blotch: typically red-fld., but with yellow varieties. Italy. B.R. 1990 (as *T. scabriscapa*). Var. **maculàta,** Hort., has soft yellowish fls. blackish at base.

7. **austrâlis,** Link. Height 12–18 in.: st. slender: lvs. 2–3, crowded together at lower portion of scape, channeled: bud nodding; perianth 1½ in. across, funnelform-campanulate, yellow, outside reddish; segms. oblanceolate-oblong, acute at apex, slightly puberulent; anthers yellow; filaments flattened, bearded at base; ovary narrowed at collar. Savoy, France, Spain, Portugal, and Algeria. Gn. 45:486.



3870. A Parrot tulip.—Tulipa Gesneriana var. Dracontia. (×⅙)

8. **primúlina,** Baker. Bulb ovoid, 1 in. diam., the outer coats brown and thinly appressed-hairy inside: st. glabrous. 1-fld., less than 1 ft. long: lvs. 3–6 near base of st., linear and channeled, glabrous: fl. very fragrant, pale primrose-yellow somewhat red-tinged on outside, funnel-shaped, 1½ in. long; segms. oblong-lanceolate and acute, the inner ones hairy at base. Algeria. B.M. 6786.—Closely allied to *T. australis.*

9. **viridiflòra,** Hort. Outer bulb-tunic glabrous except around root-crown, where there is a dense fringe: st. glabrous and glaucous: lvs. lorate-lanceolate, undulated, glabrous, glaucous, edges slightly ciliated near base: fl. large, soft green, edged with yellow or white. Gn. 32: 514.—Garden form. Bears some resemblance to a Parrot tulip. Var. **prècox,** Hort., is larger, pale green.

10. **fúlgens,** Hort. Garden form with beautiful scarlet fls.: height 8–18 in.: lvs. 3, lanceolate or ovate, very wavy: perianth-segms. all oblong-ovate, acute; anthers yellow; pollen yellow; filaments white, flattened, glabrous; ovary prismatic; stigmas small, not wavy.

11. **macrospeila,** Baker. A supposed hybrid of unknown origin, *T. Gesneriana* probably being one of its parents. Height 10–18 in.: lvs. 3–4, long and narrow, lowest long-lanceolate, flat, pendent: peduncle wiry: perianth campanulate, slightly funnelform, emitting a heavy sweetish unpleasant odor, bright crimson to cerise or cherry-red, with a distinct nearly black cuneate basal blotch broadly margined with yellow or yellowish white at top; segms. obtuse or outer sometimes acute, outer reflexed, inner erect; filaments dilated, white at base, black, violet or striated above, glabrous; ovary prismatic, creamy white; stigmas same color, large, slightly undulated.

12. **Gesneriàna,** Linn. COMMON GARDEN OR LATE TULIPS. Figs. 3862, 3864, 3865, and others. Height 6–24 in.: st. erect: lvs. 3–4 or more, lower lorate-lanceolate or ovate-lanceolate, often undulated, glaucous, pubescence variable: peduncle erect: perianth campanulate, 1–2½ in. long, inodorous, bright red or varicolored, when bright red with only an obscure basal

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blotch, which is usually yellow but may be dark or even blackish or mixed, sometimes white; segms. all obovate-oblong, obtuse, broadly rounded at apex, often with a small cusp in the center; filaments glabrous, flattened; ovary prismatic; stigmas large and usually crisped. Origin uncertain. Intro. from the Turkish gardens in 1554. Long since hybridized and cult. out of all semblance to any wild forms. Supposed original form (Baker) in B.M. 6439 (as *T. Schrenki*). Darwin tulips (Fig. 3871) are a strain of long-stemmed late self-colored tulips.

Var. **Dracóntia,** Baker. PARROT TULIP. Fig. 3870. Similar in habit: perianth usually yellow and red striped and splotched; segms. deeply cleft and laciniately dentate. F.S. 21:2211 (as *T. turcica*).

Var. **spathulàta,** Hort. (*T. spathulàta,* Bertol.). This differs from the type in its larger fls. of a brilliant red color with a large purplish black blotch at the base of each of the segms. Italy.—Probably the largest of the wild tulips.

Var. **Strangewaysiàna,** Hort. Very large brilliant dark scarlet fls., with a handsome dark basal blotch. One of the naturalized tulips found without disposition to vary in fields near Florence, Italy. F. 1881:65.

Var. **álbo-oculàta,** Krelage. Deep campanulate fl., with a slight sweetish mawkish odor, bright red, with a distinct white basal blotch; inner segms. obtuse, outer acute; filaments white.

13. **nítida,** Hoog. Bulb ovoid and small, with long neck, the brown coats glabrous inside except a few short hairs at base and top: scape slender and very short (2–3 in. high), glabrous: lvs. 3, linear-lanceolate, falcate and channeled: fl. bell-shaped, 1½ in. long, intense and very brilliant vermilion-scarlet with small well-defined black blotch at base of segms.; inner segms. obovate, outer segms. oval and shorter. Bokhara. G.C. III. 31:351.

A3. *Outer bulb-tunic with a few appressed hairs inside toward the top.*
- B. *St. pubescent.*
  - C. *Lvs. blotched with linear chestnut-brown spots: filaments not bearded at base* ..... 14. **Greigii**
  - CC. *Lvs. not blotched: filaments bearded at base* ..... 15. **Eichleri**
- BB. *St. glabrous (T. Kolpakowskiana sometimes obscurely pubescent).*
  - C. *Lvs. ovate or broadly lanceolate.*
    - D. *Filaments bearded at base* ..... 16. **pulchella**, 17. **violacea**
    - DD. *Filaments not bearded* ..... 18. **carinata**, 19. **vitellina**
  - CC. *Lvs. narrowly lanceolate to linear or linear-lanceolate.*
    - D. *Filaments bearded at base* ..... 20. **sylvestris**
    - DD. *Filaments not bearded, glabrous* . 21. **Ostrowskiana**, 22. **Kolpakowskiana**, 23. **Sprengeri**

14. **Greigii,** Regel. Height 2–8 in.: lvs. usually 4, obscurely downy, much undulate toward cartilaginous border: perianth campanulate, 3–3½ in. long, 5 in. across, spreading abruptly from about the middle, bright crimson with a large dark basal blotch margined with yellow; segms. uniform, obovoid, cuspidate or emarginate; anthers yellow; filaments black, glabrous; ovary narrowed at collar; stigmas yellow, twice as broad as neck of ovary, reflexed. Turkestan. B.M. 6177. F.S. 21:2261. F. 1876:217. G.Z. 21:265.—Early-blooming. Var. **álba,** Hort., has segms. white-margined.

15. **Eichleri,** Regel. Height 6 in.: lvs. 12–15 in. long, lanceolate-acuminate, margins plane and smooth: perianth broadly campanulate, 2½–3½ in. across, deep scarlet with a broad-cuneate dark violet-blue basal blotch margined with yellow; segms. rounded at top with a mucro; anthers violet-brown; filaments black; stigmas very thick, undulate, pale yellow. Georgia in Asia. B.M. 6191. F. 1877:169.—Allied to *T. Greigii.*

16. **pulchélla,** Fenzl. Height 4 in.: lvs. 2–3, crowded and spreading close to the surface of the ground, channeled, obscurely ciliate on edges: perianth funnelform, erect, 1–1½ in. long, 2½ in. across, bright mauve-red above, passing downward into a slaty lilac without any dark-colored blotch, but bright yellow at base; segms. all acute, densely pilose at base; filaments linear; ovary clavate; stigmas less than ovary-diam. Alpine regions of Cilician Taurus, 1877. B.M. 6304.—A dwarf species near to *T. Hageri.*

17. **violàcea,** Boiss. & Buhse. Less than 12 in. high: lvs. 3–5, crowded: perianth campanulate with a contracted base, 1½ in. long, 2 in. wide, fragrant, typically bright mauve-red or rosy crimson flushed with purple, varying to white with a slight flush of red outside, with a large brown or black basal blotch, usually bordered with white; segms. uniformly oblong, subacute; stamens black or purple; stigmas small. Persia. Intro. to cult. 1890. B.M. 7440. G.M. 39:390.—Allied to *T. Hageri* and *T. pulchella.*

18. **carinàta,** Hort. Krelage. Lvs. 3, not crowded, as long as fl.-stalk, slightly undulate, lightly ciliate on edge near base: perianth open-campanulate, 3 in. long, dark scarlet, tinged with green just above and blending into a bright yellow basal blotch; segms. acute, cuspidate; stamens yellow; ovary prismatic; stigmas white, not undulated. Habitat unknown. Vars. **rúbra** and **violàcea,** Hort., are offered.

3871. A Darwin tulip (×⅙). See No. 12.

19. **vitellína,** Hort. Lvs. 4, not crowded, as long as fl.-stalk, not undulated, thinly ciliate on edges: peduncle slightly tinged with red near fl.: perianth campanulate, 2 in. long, sulfur-yellow, no basal blotch; inner segms. rounded, outer acute; filaments yellowish white; stigmas not undulated.—Said to be "hybrids between *T. suaveolens* and *T. Gesneriana.*" It is one of the "Cottage Garden" tulips, a class of old-fashioned tulips which have been preserved from oblivion in the gardens of the poor. Recently they have been restored to popular favor. Well worth attention.

20. **sylvéstris,** Linn. Height 9–15 in.: lvs. usually 3, at base of scape, channeled, linear-lorate: peduncle sometimes 2-fld. in cult.: bud nodding; perianth funnelform-campanulate, 1½–2 in. long, yellow; segms. all acute, inner narrower; ovary bladder-form (narrowed at collar); stigmas smaller than ovary-diam., yellow. Said to be native in England and widely so in Eu.—In cult. as *T. florentina* and *T. florentina* var. *odorata.*

21. **Ostrowskiàna,** Regel. Outer tunics of the bulb blackish, strigose-pilose at their apex inside: st. 3-lvd., glabrous, 1-fld., 8–10 in. high including the peduncle: lvs. glaucescent, glabrous, immarginate, the lower narrowly lanceolate, strongly undulate, the upper linear-lanceolate to sublinear, shorter than the st.: peduncle glabrous: sepals more or less spreading, elliptic, per-

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ceptibly narrowed into a short cusp, purplish brick-red, base marked with a blackish spot, glabrous; filaments glabrous. Turkestan. Gt. 33:1144. B.M. 6710 (as *T. Kolpakowskiana*).

22. **Kolpakowskiàna,** Regel. Tunics of the bulb fuscous, strigose-pilose toward the apex inside: sts. 3-lvd., 1-fld.: lvs. erect-spreading or spreading, undulate, obscurely cartilaginous margined, margin smooth or scaberulous, lower lvs. narrowly lanceolate or linear-lanceolate, upper rather linear (sublinear): peduncle glabrous: perianth erect; sepals spreading, elliptic-lanceolate to lanceolate, all acute or rarely rather obtuse, yellow, outer ones very often becoming reddish or greenish dorsally or entirely purple in a variety, apex and base glabrous; stamens glabrous. Turkestan. B.M. 6635 and G.C. III. 27:309 (both as *T. Borszczowii*).—Nearly allied to *T. Gesneriana*, Linn., which differs in the 3–4-lvd. st., the broader immarginate lvs. and in the campanulate-connivent frequently obtuse segms. of the perianth.

23. **Sprèngeri,** Baker. Late-flowering: height 10–18 in.: lvs. 4, close together, long, linear-lanceolate, stiff: peduncle wiry, tinged with deep red under fl.: perianth open-campanulate (star-shaped), 2 in. long, bright scarlet with a somewhat dull brown basal blotch margined all around with dull orange-yellow, all blending into one another; segms. all oblong-ovate and cuspidate; filaments reddish brown; ovary reddish; stigmas equal to narrow collar. Hab.(?). Intro. by Dammann & Co., Naples, 1894. Gn. 56:438. Gt. 44:1411. G.M. 49:665. Said to be the latest tulip.

A4. *Outer bulb-tunic with scattering appressed hairs all over inside.*
- B. *St. pubescent (T. maculata finely so and sometimes glabrous; T. Tubergeniana not considered).*
  - C. *Perianth usually bright red with a yellow basal blotch* ..... 24. **elegans**
  - CC. *Perianth orange-scarlet, vermilion, or red, with a dark brown, purplish, or bluish black basal blotch* ..... 25. **maculata**
    26. **Micheliana**
    27. **Tubergen-**
    28. **ingens** [iana
- BB. *St. glabrous, or essentially so (see No. 27).*
  - C. *Lower lvs. linear* ..... 29. **Maximowiczii**
  - CC. *Lower lvs. lorate or linear-lanceolate.* 30. **Kesselringii**
  - CCC. *Lower lvs. lanceolate or broadly so.*
    - D. *Lvs. very much undulated* ..... 31. **platystigma**
    - DD. *Lvs. slightly or not at all undulated.*
      - E. *Perianth-segms. all rounded or obtuse at top, not ending in point* ..... 32. **Korolkowii**
      - EE. *Perianth-segms. (or at least half of them) acute or cuspidate.*
        - F. *Inner and outer segms. acute or at least short-pointed.* [niana
          33. **Kaufman-**
          34. **Hoogiana**
          35. **saxatilis**
        - FF. *Inner segms. rounded, the outer acute* ..... 36. **armena**
          37. **Billietiana**
          38. **Didieri**

24. **élegans,** Hort. Height 12–18 in.: lvs. 3–4, below middle of st., lorate-lanceolate, finely ciliate upon upper face: perianth beautiful scarlet with yellow base, campanulate, 3–3½ in. long; segms. uniform, narrowed gradually to a very acute point; anthers violet; filaments glabrous; stigmas larger than ovary-diam., yellowish.—Known in gardens only. Krelage catalogues a variety as "Cottage *elegans picolee*," which has larger lvs. and white fls. edged with rose, and without basal blotch. Probably a hybrid between *T. acuminata* and *T. suaveolens*, according to Baker.

25. **maculàta,** Hort. Height 12–18 in.: lvs. 3–4, lorate-lanceolate: perianth fine scarlet, campanulate, 2–2½ in.; segms. obovate, cuspidate, very wide beyond middle; anthers purple; filaments glabrous; stigmas small.—"A well-marked garden race, with the habit of *T. Gesneriana*, from which it differs by its small stigma, pubescent peduncle, and bright red fl.-segms., with a broad black basal blotch."—Baker.

26. **Micheliàna,** Hoog. Bulb ovoid, to about 1½ in. diam., the outer brown coats clothed inside with long buff-colored hairs: scape pubescent, about 1 ft. high: lvs. usually 4, very glaucous, often brown-striped, lanceolate and the upper ones linear-lanceolate, very undulate: fls. single, large, vermilion-scarlet inside and lilac-tinged outside; outer segms. oblong-ovate and cuspidate; inner segms. obovate, mucronate; all segms. with black lanceolate blotches at base. Steppes of Trans.-Caspia. G.C. III. 31:353.

27. **Tubergeniàna,** Hort. Outer bulb-scales hairy inside: lvs. broad-lanceolate-acuminate: fls. single, large, vivid crimson with very dark-margined blotch at base of the broad acuminate-pointed segms.; bud before expansion conical with tips of outer segms. reflexed. Bokhara. G.C. III. 35, suppl. June 4. G.M. 51:711. F.E. 3:94.

28. **ingens,** Hoog. Bulb ovoid and large, the outer scales covered on inside with long silky hairs, especially toward the base and the apex of the bulb: st. or scape about 10 in. high, pubescent: lvs. 3, undulate, the lowest broad-lanceolate and the upper linear-lanceolate, very glaucous, and the upper surface white-hairy: fls. very large, to 4 in. long, funnel-bellshaped, bright scarlet-vermilion with a prominent black blotch at base or covering entire claw; inner segms. obovate, mucronate; outer segms. oblong-ovate, mucronate, bearing outside a broad yellowish band; filaments subulate, glabrous. Bokhara. G.C. III. 32:14.

29. **Maximòwiczii,** Regel. Lvs. erect: peduncle glabrous: perianth crimson, with a black basal blotch; segms. obtuse, ending in a short sharp point; anthers light purple; filaments linear, not bearded. E. Bokhara, 1889. Closely allied to *T. linifolia*, from which it differs in having outer bulb-tunic hairy at apex (not woolly), erect lvs. and sharp-pointed perianth-segms. Gt. 38:1307. G.C. III. 19:757.

30. **Késselringii,** Regel. Lvs. 4–5, crowded at base of st., lorate-lanceolate, or linear channeled: peduncle sometimes obscurely puberulent: perianth campanulate, 1½–2 in. long, bright yellow, flushed with red and green outside; inner segms. subobtuse, outer acute; stamens bright yellow; filaments glabrous; stigmas not equal to ovary-diam. Turkestan. B.M. 6754.

31. **platystìgma,** Jord. Height 18 in.: st. slender, glabrous: lvs. 3–4, very much undulated: peduncle glabrous: perianth campanulate, 2 in. long, violet-scented, magenta-red; segms. obovate-oblong; claw blue tinted with a yellow spot in the middle; filaments not bearded; anthers violet-colored; ovary prismatic; stigmas very large and undulated. France.

32. **Korolkòwii,** Regel. Height 6–9 in.: lvs. 2–3, falcate, margin crisped: perianth campanulate, red, with a distinct black basal blotch; inner segms. oblong, outer obovate; filaments lanceolate; stigmas small. Turkestan, 1875. Var. **bìcolor,** Hort. Wallace. Described as having fls. about the size of those of *T. Clusiana* and "of extreme beauty in form and coloring; the buds are of a soft buff and yellow tone, and, when expanded, the segments display a scarlet blotch." Gn. 59, p. 275.

33. **Kaufmanniàna,** Regel. Less than 12 in. high: lvs. 2–3; perianth subcampanulate, 2–3 in. long, 2½–4 in. across, bright yellow in original form, tinged with red outside, without basal blotch; in cult. very variable in color, often cream-white, and nearly always with a deep yellow basal blotch; anthers lemon-yellow, linear;

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filaments bright orange, linear flattened; ovary pyramidal; stigmas small in cult. form, but described as large. Turkestan, 1877. B.M. 6887. G.C. III. 51:217. Gn. 65, p. 198; 71, p. 199; 72, p. 190; 75, p. 216; 77, p. 195; 78, pp. 178, 506. Gn.W. 21:345. G.M. 56:211. Var. **aùrea,** Hort. Segms. of perianth red, with yellow markings outside and entirely yellow or orange-yellow inside. Gn. 74, p. 241. G.M. 47:147. Var. **coccínea,** Hort. Fls. rich brilliant scarlet, at the base clear yellow.—*T. Kaufmanniana* is a handsome and valuable species, blooming exceptionally early. Sometimes called "water-lily tulip" from the resemblance of the partially opened fls. to those of nymphea.

34. **Hoogiàna,** Fedtsch. Outer bulb-scales covered on inside with reddish hairs: st., including bloom, 6–18 in. high, smooth: lvs. 4–6, lanceolate-tapering, smooth, with a narrow membranous white short-ciliate margin, the lowest 8–10 in. long and 1½–3 in. broad: fl. scarlet, with a large black blotch bordered with orange on each segm. within the cup and a corresponding yellow mark on the outside; segms. broad, somewhat abruptly acuminate at apex; filaments linear-lanceolate, blackish violet; anthers blackish. Cent. Asiatic desert (Bokhara), "a brilliant and striking species." G.C. III. 48:62.

3872. Tulipa acuminata.—A form with long-pointed petals, the old Turkish garden pattern. (×⅓)

35. **saxátilis,** Sieber. Distinct: bulb ovoid, medium size: height 12 in. or more: st. usually branched low down and bearing 2 fls.: lvs. usually 3, sometimes lowest 12 in. long, lanceolate or linear and glabrous: perianth oblong-funnelform, 2–2½ in. long, 3 in. across, light mauve-purple, at base bright yellow; segms. pubescent at base, all acute and the inner ones obovate-cuspidate; anthers blackish; filaments bright yellow; ovary prismatic; stigmas small. Crete. B.M. 6374. Gn. 56:102; 72, p. 214; 77, p. 196.

36. **armèna,** Boiss. Lvs. 5, crowded at base of st., falcate, glaucous and glabrous, slightly undulated, long, ciliate on edge all around, longer than fl.-stalk: peduncle glabrous, finely dotted: perianth open-campanulate, slightly sweet-scented, 2 in. long, dark scarlet with black basal blotch margined all around with yellow; inner segms. rounded, outer acute; anthers purple; filaments flattened, black, not bearded.—This name is referred by Baker without hesitation to *T. Gesneriana*, but the plants in the trade as *T. armena* differ as indicated above.

37. **Billietiàna,** Jord. & Fourr. Lvs. 3–4, undulate, not ciliate on edge: perianth open-campanulate, 2 in. long, 3½ in. across, inodorous, bright yellow, flushed with scarlet-pink, especially outside, with obscure basal blotch striated with blue-black lines; anthers dark gray or blackish; filaments yellow, with dark striations; ovary narrowed at collar; stigmas light yellow, very large and crisped. Savoy, Italy. B.M. 7253. G.M. 38:311.—One of the late tulips.

38. **Didièri,** Jord. Height 12–18 in.: lvs. 3–4, undulate, acuminate: perianth campanulate, 2–2½ in. long, 4½ in. across, bright crimson, with purple basal blotch margined with yellow or yellowish white; outer segms. reflexed; stamens same color as basal blotch; ovary narrowed at collar; stigmas larger than collar-diam., white. Savoy, Italy, and Alps. B.M. 6639. Gn.W. 21:1067. Var. **Mauriàna,** Baker. Lvs. narrower, slightly undulate: perianth brilliant red, with wide yellow blotch. Var. **planifòlia,** Baker. St. slender: lvs. narrow, not undulated: perianth deep red, faintly marked with yellowish red or blackish blotch. Var. **álba,** Krelage. Peduncle stiff, mottled with red: perianth light lemon-yellow, or white tinged green outside, basal blotch limited to a few dark striations; filaments same color as fl. Var. **lutéscens,** Krelage. Lvs. 3, slightly falcate: perianth light yellowish white streaked with red, with a bluish violet, dark basal blotch; filaments colored like the blotch in perianth. Var. **albiflòra,** Hort., white-fld., is mentioned. G.W. 12, p. 378.

A5. *Outer bulb-tunic pubescent inside, often or mostly densely so at apex.*

B. *Perianth-segms. very long, linear, and acuminate*.....39. **acuminata**

BB. *Perianth-segms. oblong, all uniform and acuminate*.....40. **retroflexa**

BBB. *Perianth-segms. abruptly cuspidate*.41. **Borszczowii**

BBBB. *Perianth-segms. all narrowly oblong; inner acute, outer rounded at top*.....42. **Dammannii**

39. **acuminàta,** Vahl. Fig. 3872. Height 12–18 in.: lvs. 4, lowest lanceolate, all undulated at margins: peduncle shining: perianth very open, light yellow splotched with red lines; segms. sometimes 4½ in. long, less than ½in. wide, with edges rolled in; stamens yellow; filaments flattened, glabrous; ovary prismatic; stigmas very large, yellow, not undulated. Turkey(?) "This, the well-known Turkish tulip, is a most distinct type, of which the native country is not clearly known. It has the bulb, leaf, and glabrous peduncle of *T. Gesneriana*, and the flower is similarly variable in color."—Baker.

40. **retroflèxa,** Hort. Lvs. long-lanceolate, sometimes linear-lanceolate, slightly ciliate on edge, otherwise glabrous: peduncle somewhat shining: bud nodding; perianth open funnelform-campanulate, yellow, a shade darker at base—a trace of a very obscure basal blotch; segms. uniform in width, linear-lanceolate, acuminate, twisted, undulated edges; stamens yellow; filaments flattened, glabrous. A supposed garden hybrid between *T. Gesneriana* and *T. acuminata*. Gn.W. 23: suppl. July 7. Gn. 78, p. 452.

41. **Borszczòwii,** Regel (later spelled *Borsczowii*. Pronounced *Borshòvii*). Bulb ovate, fuscous, outer tunics pubescent within: plant glaucous, very glabrous: st. 12–18 in. high, white pruinose, lower third covered with lacerate scarious sheaths, 1-fld.: lvs. bluish green, ovate-lanceolate, gradually attenuate from the broader base to the apex, decreasing in size, four in number, the lower up to 6 in. long, more or less undulate: petals cuneate-obovate, apex rounded to the noticeably abrupt cusp, red with an obovate black blotch at base; stamens glabrous. Steppes of Kara-Kum on the Aral Sea. Gt. 33:1175.

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42. **Dâmmannii,** Regel. Height 6 in.: lvs. 4, placed whorl-like at middle of st., linear-lanceolate, recurved, obscurely bristly, ciliate on margin, otherwise glabrous: peduncle glabrous: perianth spreading, star-shaped, purplish or reddish with an oblong-lanceolate black blotch without yellow border; segms. narrowly oblong; filaments filiform, glabrous; stigmas broader than ovary-diam. Mt. Lebanon, 1889. Gt. 38:1300.—Allied to *T. linifolia* and *T. Maximowiczii.*

A6. *Outer bulb-tunic woolly at apex inside.*

B. *Filaments bearded at base*.....43. **Lownei**

BB. *Filaments not bearded.*

C. *Perianth crimson or scarlet, with a distinct basal blotch*.....44. **linifolia**
45. **Wilsoniana**
46. **montana**

CC. *Perianth yellow, without basal blotch*.47. **Batalinii**

43. **Lòwnei,** Baker. Height 2–4 in.: st. glabrous, sometimes 2-headed: lvs. 2, lanceolate, acuminate, falcate, glabrous: peduncle slender, glabrous: bud slightly nodding; perianth funnelform, small, white with a bright yellow basal blotch, tinged outside with light purple or purplish pink, inner segms. wider; stamens yellow; ovary narrowed at collar; stigmas very small. Mountains of Syria and Palestine, 1874.

44. **linifòlia,** Regel. Dwarf: bulb ovoid, ½–¾in. diam., the tunics blackish and "bearded inside at the apex with brownish hairs:" st. somewhat shining, sometimes 2-headed: lvs. 6 or 7, linear and grass-like, spirally arranged, spreading, glabrous: perianth open-campanulate, small, bright crimson; basal blotch bluish black; inner segms. oblanceolate, outer ovate and slightly wider; anthers pinkish; pollen gray; filaments bluish black; ovary pyramidal; stigmas very small, yellowish white. Bokhara: B.M. 7998. Gn.W. 21:707.

45. **Wilsonìana,** Hoog (*T. Watsonìana,* André). Differs from *T. linifolia* in bearing a mass of protruding woolly hairs from the bulb rather than short and bristly hairs, in having fewer and somewhat broader lvs., fls. more distinctly margined with red and more upright-growing in the later stages of development, in the obovate inner segms., and in the longer ovary and broader filaments. Mountains of Trans-Caspia, southwest of Aschabad. G.C. III. 29:327.—Named for G. F. Wilson of Weybridge, England. The fls. are "of a particularly deep and full vermilion-scarlet;" outer segms. oblong, with small cusp; inner segms. obovate, more or less retuse: scape short, 2–4 in. high.

46. **montàna,** Lindl. Bulb large and ovoid, with dense pubescence: height 4–8 in.: lower lvs. oblong-lanceolate, acuminate, undulated, very glaucous: peduncle glabrous: perianth campanulate, 1½–2 in. long, 2 in. across, deep crimson, paler outside; segms. ovate or oblong, flat, acute, the inner often obovate obtuse; filaments purplish; ovary prismatic; stigmas small. Mountains of Persia. B.R. 1106. Var. **Jùlia,** Koch. Dwarf, from Caucasus. Not more than 3–4 in. tall: fls. bright red, 1 in. or less long; all 6 segms. obovate and obtuse.

47. **Batalínii,** Regel. Bulb globose, with thin tunic: height 5 in.: st. glabrous: lvs. 5, crowded into a sort of whorl just below middle of st., linear-lanceolate, glabrous, slightly undulated: perianth campanulate, slightly funnelform, pale yellow; segms. slightly unequal, oblong-ovate, obtuse or short-acute, sometimes deeply incised on the edge near the top; filaments linear, terete, yellow; ovary elliptic-oblong, compressed, trigonous; stigmas coroniform. E. Bokhara, 1889. Gt. 38:1307. B.M. 7991. G.C. III. 19:759; 49:382.—One of the early tulips.

A7. *Outer bulb-tunic everywhere woolly inside.*

B. *Filaments bearded at base.*

C. *The filaments flattened*.....48. **biflora**

CC. *The filaments cylindric*.....49. **Clusiana**

BB. *Filaments not bearded*.....50. **stellata**

C. *Perianth bright yellow, with obscure basal blotch or none*.....51. **Biebersteiniàna,** Schult. f. Height 6 in.: st. slender, glabrous: lvs. 2–4, crowded together, long, channeled, glabrous, slightly ciliated on edge: bud slightly nodding; perianth open-campanulate, 2½ in. long, bright yellow tinged with scarlet-pink on edges and sometimes green outside; at base a brownish yellow discoloration; inner segms. obtuse, outer acute; anthers gray; pollen yellow; filaments yellow; ovary prismatic; stigmas yellow, undulated. Asia Minor.

CC. *Perianth bright scarlet, with a distinct black or purplish basal blotch margined with yellow*.....52. **Oculus-solis** [steiniana
53. **præcox**

48. **biflòra,** Pall. Height 3–6 in.: st. glabrous or slightly pilose, usually 2- or 3-fld., rarely 4-, 5- or 6-fld.: lvs. often 2, sometimes 3, linear, long: perianth funnelform-campanulate, 1 in. long, 2 in. across, pale yellow or white inside, tinged with green or red or even purplish outside; segms. acute; filaments flattened, ciliated at base; ovary narrowed at collar; stigmas small. Mountains of Cent. Siberia and the Caucasus. B.R. 535. B.M. 6518. Var. **turkestánica,** Hort. More robust than the type and larger in all its parts: fls. often 4 or 5 on the scape. G.C. III. 47:85.

49. **Clusiàna,** Vent. Described by Baker as "one of the most widely spread and clearly marked of all the tulips, and one that shows the least tendency to vary:" bulb small and densely pilose: height 12–18 in.: st. slender, glabrous: lvs. 4–5, very long and narrow and folded double, linear-acuminate, pendent: peduncle slender, tinged with brown directly under fl.: perianth small, when open 2 in. across, funnelform-campanulate, very fragrant, delicate white (sometimes described as lemon-yellow), with a purplish black base and black stamens, outside flushed with red; segms. acute; claw hirsute on edge; stamens yellow; filaments cylindric, densely bearded at base; ovary pyramidal; stigmas small, tinged with red. Portugal, through Medit. region to Greece and Persia. B.M. 1390. Gn. 77, p. 171. Gn.W. 22:329.

50. **stellàta,** Hook. Close ally of *T. Clusiana,* with similar lvs. and habit, according to Baker, but the segms. more obtuse and the fl. always without the distinct purple eye, the fl. very wide open in sunlight. Himalaya. B.M. 2762.—Bright yellow variations are mentioned.

51. **Biebersteiniàna,** Schult. f. Height 6 in.: st. slender, glabrous: lvs. 2–4, crowded together, long, channeled, glabrous, slightly ciliated on edge: bud slightly nodding; perianth open-campanulate, 2½ in. long, bright yellow tinged with scarlet-pink on edges and sometimes green outside; at base a brownish yellow discoloration; inner segms. obtuse, outer acute; anthers gray; pollen yellow; filaments yellow; ovary prismatic; stigmas yellow, undulated. Asia Minor.

52. **Óculus-sòlis,** St. Amans. Tall, 12–18 in.: st. slender, glabrous: lvs. 3–4, lorate-lanceolate, acute, glabrous: perianth funnelform-campanulate, 2½–3 in. long, 4½ in. across, scentless, erect; segms. bright red, with a large long black yellow-bordered blotch, very acute, the inner ones often less so; anthers yellow; filaments purple; ovary prismatic. South of France, Italy, and Switzerland. B.R. 380 (as *T. Gesneriana*). Var. **Lortétii,** Baker. A slight variety, the basal spot oblanceolate and black. Marseilles. Var. **lýcica,** Baker. St. 6–8 in. long: lvs. crowded: perianth-segms. all acute, inner oblanceolate-oblong; apex subdeltoid; blotch black; anthers and filaments dark purple. Lycia, Asia Minor. Var. **aléppica,** Baker. A form with fls. considerably smaller than W. European type, with a smaller black basal blotch. Asia Minor, Syria, and Palestine.

53. **præcox,** Tenore. Height, 12–18 in.: st. slender, glabrous: lvs. 3–5, lorate-lanceolate, acute, undulated at margin: perianth beautiful scarlet, campanulate, 2–3 in. long, 3 in. across, erect, scentless; basal blotch oblong or oblanceolate and purplish black, margined with yellow; segms. widely imbricated, outer slightly longer, acute, puberulent at apex; inner shorter, obtusely cuspidate; anthers yellow; filaments long, dark purple, glabrous; ovary prismatic; stigmas pubescent, reddish. Italy and S. France; also Algeria,

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CXIV. Tulip varieties of the Tulipa Gesneriana type.

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Greece, Syria, Palestine, and Persia. Very closely allied to last, and figured as such in B.R. 204, 1143, 1419; differs, according to Baker, "by its more robust habit of growth, earlier flowering, and ovate more imbricated perianth-segms., with a less clearly marked basal blotch."—One of the oldest known species.

T. flàva, Hort., is "often confused with vitellina in gardens, though perfectly distinct. Flava is yellow, very robust, tall, and at least a fortnight later in blooming. Vitellina is almost white when old." Imperfectly known.—*T. Fosteriàna*, Hort. Fls. very large, rich intense glowing crimson with a darker blotch at the base of the segms.: lvs. very broad, many-nerved: of robust habit and easily grown. Bokhara. G.C. III. 39:323.—*T. galàtica*, Freyn. Tunics silvery hirsute within: st. glabrous: lvs. linear-lanceolate, acuminate: fls. yellow; outer segms. elliptic to oblong-elliptic; inner segms. spatulate, rounded. Asia Minor.—*T. lanàta*, Regel. Dwarf: fls. large, goblet-shaped, rich vermilion, with a large black spot at the base of each of the segms. Bokhara.—*T. Leichtlinii*, Regel. Bulb-tunics glabrous inside: height 9–18 in.: st. glabrous: lower lvs. lanceolate-linear: fl. erect; perianth between campanulate and funnelform; outer segms. narrow and acute, the outer bright purple with broad white margin, the inner much shorter and obtuse at apex and yellowish white. Kashmir. Gn. 40:174.

ARNOLD V. STUBENRAUCH.
L. H. B.†

TUMBÒA (native name). *Gnetàceæ*. Applying strictly the rules of priority, *T. Bàinesii*, Hook. f., becomes the name of the strange plant long known as *Welwitschia mirabilis;* in this work, the description is given under the latter name.

TUNGSHU: *Aleurites Fordii.*

TÙNICA (Latin, a *tunic* or *coat*, from the imbricated involucre). *Caryophyllàceæ*. Annual or perennial hardy herbs, usually slender but stiff garden plants, with the habit of Gypsophila but botanically more nearly allied to Dianthus; sometimes grown in flower-gardens.

Leaves narrow: fls. as in Dianthus, but smaller, gathered in cymose panicles or heads; calyx turbinate or elongate-tubular, obtusely 5-toothed, 5–15-nerved; petals 5, claw elongate, blade retuse or emarginately 2-cleft; stamens 10; ovary 1-celled: caps. ovoid or oblong, dehiscent by 4 valves.—About 20 species, S. Eu. and E. Asia. Prop. by seeds or division.

Saxífraga, Scop. Apparently the only species in cult. A tufted spreading hardy plant suitable for rockwork and blooming in summer and fall. It is a wiry-stemmed perennial, growing 6–10 in. high: fls. small, with rosy white, lilac or pale purple notched petals. G. 34:211. —Has become adventive in some parts of the E. Var. **álba**, Hort., is a white-fld. form. Var. **álbo plèno**, Hort., is a double white-fld. form. Var. **flòre-plèno**, Hort. (*T. Saxífraga* var. *plèna*, Hort.), has semi-double fls. about ½in. across and deeper pink than the type.

F. TRACY HUBBARD†.

TÙPA (Peruvian name of the plants). *Campanulàceæ*. Tall herbs with many-fld. terminal racemes: fls. usually red or yellow; corolla-lobes all incurved, cohering at the apex by day. About 8 species from Chile. Now considered a section of Lobelia. *T. crassicaùlis*, Hook. Subshrub about 3 ft. high: st. erect, simple, stout: lvs. densely clustered at the top of the st., spreading, reflexed, lanceolate, or broad-lanceolate, acute, base attenuate to a short petiole, serrate, pubescent above, hoary-tomentose beneath: calyx-tube hemispherical, segms. spreading, acuminate; corolla yellow-orange (finally scarlet), tube laterally compressed, limb 2-lipped. Habitat uncertain. B.M. 4505. J.F. 1:107. This has never been transferred to Lobelia; it may be a Siphocampylus rather than a Lobelia.

T. salicifòlia, Don=Siphocampylus giganteus.

TUPIDÁNTHUS (Greek, *mallet* and *flower*, referring to the shape of the fl.-buds). *Araliàceæ*. At first a glabrous small tree, becoming with age a tall climber: lvs. large, digitately compound; lfts. coriaceous, entire; stipules connate: umbellules arranged in a short panicle or compound umbel: fls. large for the order; petals connate in a leathery or fleshy hood; stamens numerous; disk convex: fr. leathery to fleshy, subglobose. One species, India. *T. calyptràtus*, Hook. f. & Thoms. Lvs. digitate; lfts. 7–9, entire, 7x2½ in., narrow-oblong, short-acuminate, narrowed at base; petiolules 2 in. long: main umbel about 3-rayed, branches 3 in. long with large bracts at their bases; umbellules 5–7-cleft: fls. green; stamens 50–70. India. B.M. 4908.

TUPÍSTRA (Greek, *mallet*, alluding to the peculiar shape of the stigma). *Liliàceæ*. Perennial herbs grown in the warmhouse. Rhizome stout, sometimes short and tuberous, sometimes elongated and annulate: lvs. radical, long, large, contracted into the petiole: scape radical, between the lvs., short or elongated, erect or recurved at the top, simple, terminated by a dense cylindrical spike: fls. sessile, grouped, violet or lurid; perianth campanulate, 6-, rarely 8-lobed, short and spreading; stamens as many as corolla-lobes; ovary free, sessile, 3- rarely 4-celled, cells 2-ovuled: berry globose, usually 1-seeded.—About 13 species, India, Burma, and Malaya. Probably no species in general cult.

The following species have been intro. into botanic gardens: *T. Clàrkei*, Hook. f. Robust glabrous herb with a thick creeping rhizome: lvs. oblanceolate, 4–5 ft. long, 2–5 in. broad, entire, shining: peduncles 3 in. long, bearing nodding or almost pendulous spikes, 3–4 in. long: fls. about 1¼ in. across, dull reddish purple inside, at first green with perianth-lobes purple-margined, finally all buff. Sikkim. B.M. 7957.—*T. grándis*, Ridley. Lvs. tufted, 2–3 ft. long, lanceolate: peduncle stout, red-brown, bearing a spike 10–12 in. long: fls. subsessile, crowded; perianth campanulate, tube ½in. long, red-brown, lobes dark red-purple; stigma broadly peltate, on a white columnar, exserted style. Perak. B.M. 7829.—*T. Macrostígma*, Baker (Macrostigma tupistroides, Kunth). Rhizome thick, creeping: flowering tufts usually 2-lvd.: lvs. petioled, lanceolate, 1 ft. or more long, acute, chartaceous, narrowed from above the middle to the point and petiole, bright green on both surfaces: peduncle dark purple, erect; spike drooping, lax, about 2–3 in. long: perianth campanulate, limb 5-parted; petals 5; stamens 5; ovary sessile, free, oblong: caps. ovoid or oblong, 3-valved at base, many-seeded, very rarely 3-seeded. About 85 species, Trop. and Subtrop. Amer., S. Afr., and Madagascar. *T. ulmifòlia*, Linn. Shrub, 2–4 ft. high: lvs. biglandular at base, oblong, ovate or lanceolate, acuminate, serrate above the cuneate base, petioled, pubescent above, white-tomentose beneath: fls. yellow, almost sessile; calyx deeply 5-lobed, lobes lanceolate, acuminate; petals large, obovate. Mex., W. Indies, and S. Amer. B.M. 4137. Var. *élegans*, Hort. (*T. trioniflòra*, Sims), is about 1 ft. high: lvs. oblong-lanceolate, coarsely serrate: fls. sessile, pale yellow or sulfur-colored, with purplish brown claws. Brazil. B.M. 2106. G. 28:381. H.F. II. 3:160. The family Turneraceæ is placed near Violaceæ and Passifloraceæ.

TURNIP is a name somewhat loosely applied to two species of vegetables. In this country, and apparently properly, it is applied to vegetables characterized by thick light-fleshed roots that are usually more or less flattened or at least not greatly elongated, with leaves that are hairy and not glaucous. These vegetables belong to the species *Brassica Rapa* (see page 543). In the term is sometimes included the Swedish turnip or rutabaga, a plant that is characterized by having a more uniformly elongated-oval yellow-fleshed tuber with roots springing from its lower part, a thick elongated leafy neck, and glaucous-blue leaves that are not hairy. This plant is considered to be *Brassica*

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campestris var. *Napo-Brassica*. Whether these two species exist separately in wild nature is not positively known, but they appear to be well defined under cultivation. Both species tend to run wild in old fields and to lose their thickened roots. They are then sometimes, though erroneously, known as charlock. (The real charlock is *Brassica* [*Sinapis*] *arvensis*, one of the mustards). The nativity of these species is unknown, but they are almost certainly European or Asian in origin. Characteristic tubers of these two plants are contrasted in Figs. 3873 and 3874. The former is commonly known here as "flat turnip" and the latter as rutabaga or merely "baga." According to Vilmorin, the plant that we know as rutabaga is known to the French as chou-navet and in England as Swedish turnip and turnip-rooted cabbage.

The culture of turnips and rutabagas is very similar, except that the rutabaga requires a longer season. The rutabaga is nearly always grown as a main-season

3873. Turnip—Brassica Rapa.

3874. Rutabaga.—Brassica campestris var. Napo-Brassica.

crop, whereas the turnip may be sown very late for winter use or very early for late spring or summer use. Usually the flat turnip is not grown in the hot weather of summer. In the northern states it is sown from the middle of July to the middle of August for late crop, or on the first approach of spring in order that tubers may be had for the early vegetable market. The late or winter crop is ordinarily used for storing in cellars and also for feeding, whereas the early crop is often sold in bunches in the open market, and later by the basket or bushel.

The turnips and rutabagas are hardy; that is, the young plants can withstand some frost. They are cold-weather plants and demand loose moist soil. Usually the seeds are sown in drills that stand from 10 to 20 inches apart. In the drills the plants are thinned until they stand from 6 to 10 inches apart, depending on the variety. For general field operations, the rows are sometimes placed as far as 30 inches apart, to allow horse tillage. Sometimes the late or winter crop is raised from seed sown broadcast, but this method gives good results only when the soil is well supplied with moisture, very thoroughly tilled beforehand and is free from weeds, since subsequent tillage is impossible. The seeds of turnips and rutabagas are of similar size, two or three pounds being required to the acre for broadcasting. When sown in drills, one-half or one-third this amount may be sufficient. The yields will sometimes reach 1,000 bushels to the acre, although the average is much less than this.

The turnip needs no special care as to cultivation. The greatest difficulties are the root-maggot, which is the larva of a small fly, and the flea-beetle. The maggot may be killed by injecting bisulfide of carbon into the soil about the roots before the grubs have burrowed deeply into the tissues. In general field operations, however, this treatment is impracticable and one must rely on growing the crop in fields which are not infested with the maggot; that is, rotation is the chief recourse. The flea-beetle may be kept in check by spraying the plants with bordeaux mixture, or perhaps better by sprinkling them with paris green diluted with land-plaster (one part by bulk of paris green to fifty of plaster).

Rutabagas have firmer and richer flesh than the turnips. They are usually more prized for consumption in winter, and turnips are usually more popular in the spring and early fall markets. Rutabagas are also more prized for stock-feeding. They yield heavily, are rich and succulent and keep well in any ordinary cellar. Rutabagas started in the middle or last of June in the northern states will reach their full growth by October. They are usually not harvested until heavy frosts have come. The roots of rutabagas and turnips sometimes persist through the winter, even though they have been solidly frozen, and send up flower-stalks in the spring; but unlike salsify and parsnips the roots should not be left in the ground to freeze if they are to be used.

L. H. B.

TURNIP, INDIAN: *Arisæma triphylla*.

TURPÍNIA (named for Turpin, French fl.-painter, died 1840 in Paris). *Staphyleàceæ*. A genus of about 10 shrubs or trees in Trop. and Subtrop. Asia, the Malay Archipelago, W. Indies, and Mex., with opposite odd-pinnate or simple lvs. and small fls. in large terminal or axillary panicles: calyx 5-parted, persistent; petals 5, broadly spatulate to orbicular; stamens 5; ovary superior, 3-celled, with a large lobed disk at the base; styles 3, distinct or united: fr. 3-celled, fleshy or leathery, with few or many seeds in each cell. Occasionally planted for their handsome foliage in S. Calif. Prop. is by seeds or by cuttings of mature wood under glass with bottom heat.

pomífera, DC. Glabrous tree: lvs. odd-pinnate, 5–20 in. long; lfts. 3–9, elliptic-oblong or ovate, acuminate, crenate-serrate, 3–8 in. long: fls. yellowish, ⅛in. across, in large terminal panicles, 6–10 in. long: fr. fleshy, red, yellow, or greenish, 1–2 in. across. Himalayas. The closely allied *T. nepalensis*, Wall., with smaller fls. and much smaller fr. is probably only a variety of this species. S.I.F. 2:40 (as *T. pomifera*).

argùta, Seem. (*Ochránthe argùta*, Lindl.). Glabrous shrub or small tree: lvs. simple, obovate-oblong to oblong-lanceolate,, acuminate, cuneate at the base, serrate, 3–5 in. long: fls. white, changing to yellowish, about ⅛in. long, in terminal panicles 2½–5 in. long: fr. about ⅛in. across. S. China. B.R. 1819.

ALFRED REHDER.

TURRÆA (named for Giorgio della Torre or Turra, 1607–1688, botanist of Padua, Italy). *Meliàceæ*. Trees or shrubs, sometimes grown in the greenhouse in the North; in the South used as outdoor ornamentals.

Leaves alternate, petioled, entire or obtusely lobed: peduncles axillary, few-fld. and many-bracted: fls. elongated, white; calyx 4–5-toothed or parted; petals 4–5, elongated, free, twisted; staminal tube 8–10-toothed, anthers 8–10; disk annular; ovary oblong, 5–10–20-celled; ovules 2, superposed in each cell: caps. 5- to many-celled, loculicidally 5- to many-valved.—About 73 species, Trop. and S. Afr., Trop. Asia, and Austral.

A. *Fls. solitary or in pairs, axillary.*

heterophýlla, Smith, not Sond. Lvs. more or less obovate-cuneate, 3-lobed above, varying to subentire: fls. ½–¾in. long. Upper Guinea. B.R. 30:4 (as *T.*

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lobata).—This name is in the Fla. trade, but it seems open to doubt whether the plant is this species.

AA. *Fls. clustered at ends of branches.*

floribúnda, Hochst. (*T. heterophýlla*, Sond.). Shrub: foliage falls away before flowering season: lvs. ovate, acute or produced into a short obtuse point, undivided or 3-lobed: fls. clustered at ends of branches: peduncles and calices silky tomentose. Natal.

F. TRACY HUBBARD.†

TUSSILÀGO (Latin, *tussis*, cough, and *ago*, referring to the medicinal use of the lvs.). *Compósitæ*. Here belongs the COLTSFOOT, the flowers of which look much like the dandelion; the leaves are large and make an attractive low covering for rough banks.

Acaulescent perennial herb more or less white-tomentose: fls. in a dense head on a scaly scape, before the lvs. of the season; tubular and ray-fls. about in equal numbers, the rays pistillate and fertile and in several rows; disk-florets sterile; receptacle flat; involucre campanulate or cylindrical, the scales in a single series: achene narrow, with soft capillary pappus.—One species.

Fárfara, Linn. COLTSFOOT. Resembles the dandelion in having scapes bearing solitary yellow fl.-heads composed of rays, but the scapes are scaly and the heads are smaller, lighter colored and borne in early spring before the main crop of dandelions. After the fls. have lost their beauty, the lvs. appear; they are heart-shaped and rounded at first, but as they grow they become more and more angled. They are covered with a soft cottony matting which diminishes toward the end of the season. It grows naturally in moist places and thrives on steep raw banks in the stiffest clay. Spreads rapidly by underground sts. Flowers in March. Native to Eu., India, and N. W. Asia. Naturalized in Amer. Gn. 23, p. 113.

Var. **variegàta,** Hort., has lvs. margined and more or less blotched with white or yellow. Gn. 37, p. 435. Lowe 56.—More commonly cult. than the type.

T. frágrans=Petasites.

WILHELM MILLER.

TUTCHÈRIA (after W. J. Tutcher, assistant superintendent of the Botanical and Forest Dept. of Hong-Kong). *Ternstræmiàceæ*. Two species of evergreen trees in S. E. China, with alternate, ovate-lanceolate lvs. and axillary, showy, white fls.: sepals imbricate in 2–3 series, silky outside, the inner ones becoming petaloid; petals 5, large; stamens many, connate at the base and adnate to the petals; ovary 4–6-celled; styles united nearly to the apex: caps. globose, woody, dehiscent with 3–6 valves; seeds angular, 2–5 in each cell. The following species has been recently intro. into England; to be recommended for its showy white fls. Hardiness and cult. probably like camellia. **T. spectábilis,** Dunn (*Camélia spectábilis*, Champ.). Small tree: lvs. short-petioled, ovate-lanceolate, acuminate, cuneate at the base, slightly crenate, lustrous above, 5–6 in. long: fls. short-stalked, white, cup-shaped, about 3 in. across, slightly fragrant; petals broadly obovate, emarginate, 1½–2 in. long: caps. globose, 2–3 in. across. Seemann, Bot. Herald, 78.

ALFRED REHDER.

TWAYBLADE: *Liparis liliifolia.*

TWEÈDIEA: *Oxypetalum.*

TWIN-FLOWER: *Linnæa borealis.* **T.-Leaf:** *Jeffersonia diphylla.*

TWISTED STALK: *Streptopus.*

TYDÆA is now considered a synonym of *Isoloma;* by some authorities called *Kohleria* (see *Isoloma*). *T. ocellàta*, Regel=*Isoloma ocellatum*. Gt. 4:180. Other species which may have been cult., but probably are no longer in trade are *T. venòsa*, Hort. (H.F. II. 3:248), and *T. Warscewiczii*, Regel (Gt. 3:72).

TŸPHA (ancient name). *Typhàceæ*. CAT-TAIL. REED MACE. Hardy perennial marsh- or swamp-growing herbs, useful in the water-garden or along brooks or the margins of ponds.

Plants forming colonies, slender or stout, often tall, smooth: rhizome strong, creeping: sts. erect, simple, base often under water: radical lvs. linear-elongated, rather thick, spongy, with or without ribs; cauline lvs. few and shorter: peduncles erect, terete, strict and not divided: spadices, male and female similar, superposed: fls. monœcious, densely clustered in the cylindrical spadix; perianth consisting of slender hairs: fr. minute, subsessile.—About 17 species, temperate and tropical regions. Monographed by Graebner in Engler's Pflanzenreich, hft. 2 (IV. 8) in 1900.

A. *Female fls. without bracts.*

B. *Plant robust, more than 3 ft. high: lvs. flat.*

C. *Pedicels columnar, 1.5–2 mm. long.*

latifòlia, Linn. Fig. 3875. Plant stout, 4–8 ft. high: lvs. usually broad, linear, ¾–1 in. broad, exceeding the flowering culm: male and female spikes contiguous, rarely remote. N. Amer., Eu., Asia. R.B. 20, p. 196. V. 2:197. J.H. III. 65:325. Var. **elàtior,** Graebn. (*T. elàtior*, Bor.), has narrow lvs. and shorter contiguous or slightly remote spikes. Eu.

CC. *Pedicels short or elongate-conoid, 1–1.5 mm. long.*

Shúttleworthii, Koch & Sond. Plant stout, 3–4½ ft. high: lvs. linear, 2–6 lines broad, longer than the flowering culm: spikes cylindrical, contiguous, pistillate spikes thick and longer than the staminate. Eu.

BB. *Plant slender, rarely over 3 ft. high: lvs. semi-cylindrical or rather flat.*

Láxmannii, Lepech. (*T. stenophýlla*, Fisch. & Mey.). Plant slender, 2½–4½ ft. high: lvs. very narrow, rarely even 3 lines broad, semi-cylindrical, grooved inside, convex outside: pistillate spike ovate-oblong or shortly cylindrical, brown, remote from the elongate staminate spike. S. E. Eu. to China.

AA. *Female fls. in the axils of bracts.*

B. *Plant stout, 3–12 ft. high: axis of male spike hairy.*

angustifòlia, Linn. Plant stout, 3–9 ft. high: lvs. narrow, 1–5 or 6 lines broad: spikes about equally long, remote, rarely contiguous; pedicels shortly conoid. N. Amer., Eu. and Asia; also in Trop. Amer.

BB. *Plant slender, 1½–3 ft. high: axils of male spike destitute of hairs.*

mínima, Funk. Plant slender, 1–2½ ft. high: lvs. of the sterile shoots very narrow, linear, less than 1 line broad, of the flowering st. basally inflated sheaths rarely bearing very short involute blades: spikes remote or contiguous, female spike broadly ovate or shortly cylindrical, rusty brown. Eu., Caucasus, and Asia.

F. TRACY HUBBARD.

TYPHÒNIUM (an old name of some plant of the family, named for *Typhon*, a mythological giant). *Aràceæ*. Perennial tuberous herbs, occasionally grown in the greenhouse. Lvs. appearing with the fls., sagittate or hastate, 3–5-lobed or -parted or pedately cut; petiole elongated: peduncle usually short: spathes persistent, throat constricted, blade ovate or lanceolate; spadix sessile or stipitate, included; male infl. cylindrical, female short: fls. in an appendiculate monœcious spadix, male and female elements remote; perianth none; stamens in the male fl. 1–3; ovary in female fl. ovoid or oblong-ovoid, 1-celled: berry ovoid, 1–2-seeded.—About 20 species, Trop. Asia, Austral., and islands of the Pacific.

gigantèum, Engl. Tuberous herb of large size: lvs. with petioles 2 ft. long, the lower 8 in., wing-sheathed; blades 1 ft. or more long, hastate, the lobes large, apex acute: spathe-tube oblong, 1¼ in. long, blade acumi-

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nate, 6 in. long; spadix with the female fls. below, the male above, the two separated by a sterile portion and the top of the spadix also sterile. China. The type does not seem to be in cult.; the form cult., var. **Giráldii**, Baroni, has larger and broader lvs., the spathe is purplish outside and is somewhat the color of a ripe olive, the tube and blade are more equal in length than the type; spadix is darker, being purplish black; pollen white. Mountains of N. China. G.C. III. 32:151. Probably adapted to outdoor planting for ornament.

F. Tracy Hubbard.

TYPHONODÒRUM (Greek, *stormy wind* and *gift*). *Aràceæ*. Robust herb, with a stout caudex 4–10 ft. high: lvs. thick, petioled, triangular-ovate or hastate, acuminate: spathes with oblong tubes attenuate at both ends, blade 3 times longer than the tube, oblong-lanceolate, caudate-acuminate; spadix erect, strict, cylindrical; male infl. elongated, female short and cylindrical: fls. monœcious in an elongated somewhat appendiculate spadix; perianth none; stamens 4–8 in the male fls.; ovary ovoid or subglobose and 1-celled in the female: berry large, compressed, orbicular. One species, Madagascar, Mauritius, and Trop. Afr. *T. Lindleyànum*, Schott (*T. madagascariénse*, Engler). St. stout, 3–10 ft. high, 4–12 in. thick: lvs. deeply cordate or sagittate, 1¼–3½ ft. long, 7 in. to 2 ft. across; petiole terete, 2–4 ft. long: spathe 1½–2 ft. long, tube 3–5 in. long, oblong, green, blade 13–19 in. long, 3–5 in. across, lanceolate, convolute below, yellow: seeds 1¾–2 in. across, flattened-orbicular, edible. B.M. 8307.—A striking plant with the habit of Zantedeschia, growing in deep water. See Engler in Das Pflanzenreich, hft. 64 (IV. 23 *Dc*), 1915.

3875. Cat-tail.—Typha latifolia.

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U

UDO, a spring blanched vegetable introduced in 1903 by Lathrop and Fairchild from Japan; it is *Aralia cordata*, and for botanical description see page 344, Vol. I.

The plant is a sturdy hardy perennial, and the strong young shoots are blanched as they grow; these shoots are used as a cooked vegetable or as a salad. It is a plant of ancient and widespread cultivation in Japan, where there are distinct strains or varieties of it. The cultivation of udo in this country is in its amateur stage for the most part, although it has been grown by the acre in the Sacramento Valley. The following account is chosen from Bulletin No. 84 of the United States Department of Agriculture, 1914, written by David Fairchild.

"There is no doubt that the udo is worthy of adding to our list of spring vegetables, for it is easily grown, its shoots are readily blanched, and it requires little care. A patch of it can be forced every spring for at least six years, and probably much longer. When properly prepared its blanched shoots are delicious; they have their own characteristic flavor, can be prepared for the table in a great variety of ways, and are keenly appreciated by people of discriminating taste. Space for space, udo will yield about the same amount of food for the table as asparagus and will be ready for use at about the same time in the spring. Possibly more labor is required to blanch the shoots of the udo than those of asparagus, but the udo is probably somewhat easier to take care of and yields sooner."

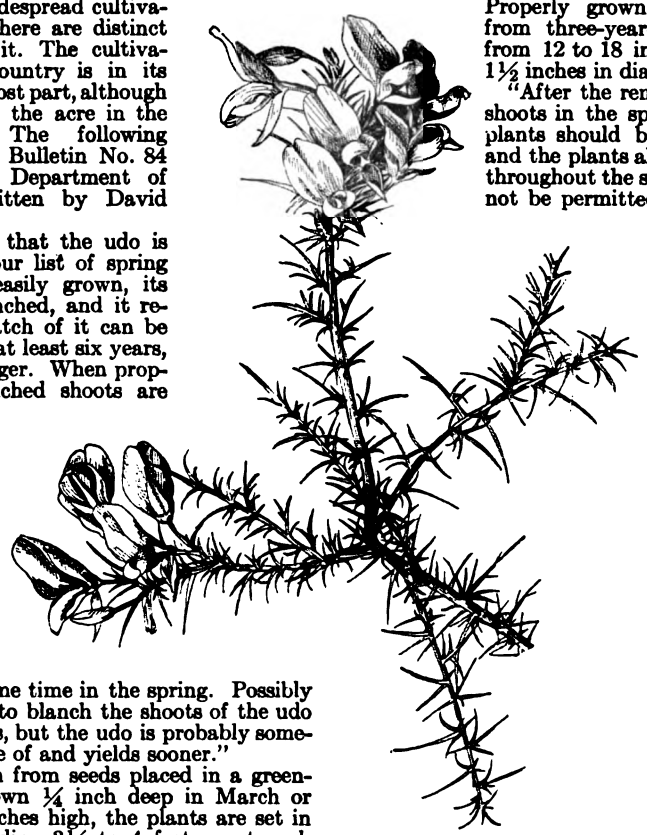
Udo is readily grown from seeds placed in a greenhouse or coldframe, sown ¼ inch deep in March or April. When 3 to 4 inches high, the plants are set in the open ground, standing 3½ to 4 feet apart each way; often they will be 6 feet high by autumn. When it is desired to propagate a particular strain, cuttings may be made of the green shoots taken when about ⅝ inch in diameter and cut 5 inches or more long, the lower end being severed just below a joint.

The stout young shoots are blanched as they emerge from the ground. In mild climates, earth may be mounded over them, but a large drain-tile placed over the mound provides a better method for the home garden.

This method "has at least one disadvantage, however, in that the shoots have a tendency to leaf out and produce a number of unopened leafstalks which take away from the robust growth of the shoots. A method which has obviated this defect in using tiles is to put around each hill a deep box or small half cask from which the bottom has been removed and fill it with light sand or such a light material as sifted coal-ashes. Shoots which come up through such a medium are almost free from the elongated leafstalks which are developed when the shoots are produced in the dark air-chambers under the tiles. Care must be taken in any method of mounding up or filling in dirt or ashes over the crowns that the shoots do not break through into the sunlight, for as soon as they do this they become green and take on a rank objectionable flavor. Properly grown udo shoots produced from three-year-old plants should be from 12 to 18 inches long and 1 inch to 1½ inches in diameter at their bases.

"After the removal of the crop of udo shoots in the spring, the crowns of the plants should be completely uncovered and the plants allowed to grow normally throughout the summer, but they should not be permitted to flower unless seed is required, the flower-clusters being pinched or cut back as they form."

For use, the shoots are first boiled in salt-water for ten minutes or so and the water changed to remove the turpentine flavor. An hour's stay in ice-water will remove the resin from the shoots, provided they are cut into thin slices or shavings; the slices may then be used in salads without cooking. It is used also in soups, and on toast.



3876. Ulex europæus.—Furze. (×⅓)

UHDÈA. A name proposed by Kunth in 1847 for a Mexican composite, still sometimes listed as *U. bipinnatifida*, Kunth. It is properly *Montanoa bipinnatifida*, Koch, the name Montanoa dating from 1825. See page 2064, Vol. IV.

ULEX (ancient Latin name of this or a similar plant). *Leguminòsæ*. FURZE. GORSE. WHIN. Ornamental woody plants grown for their handsome yellow flowers and evergreen appearance.

Spiny shrubs: lvs. mostly scale-like, only vigorous shoots near the ground bearing fully developed lvs.: fls. papilionaceous, axillary at the end of the branchlets; calyx 2-lipped, divided nearly to the base; standard ovate, wings and keel obtuse; stamens alternately longer and shorter: pods small, ovoid, few-seeded; seeds strophiolate.—About 20 species in W. and S. Eu. and in N. Afr. Closely allied to Cytisus and chiefly distinguished by the deeply 2-lobed calyx. The fls. yield a yellow dye. Sometimes cult. as a winter fodder plant in Eu., the green sprigs of one year's growth being eaten.

The furzes are much-branched shrubs with dark green spiny branches, usually almost leafless, and with

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showy yellow papilionaceous flowers which are axillary and often crowded at the ends of the branches. They are not hardy North, but under protection they survive the winters in New England. They are valuable as sand-binders for covering dry sandy banks and are also well suited for seaside planting. On account of their dark green branches they have the appearance of evergreen plants and they are very showy when covered with their yellow flowers. They are also sometimes used for low hedges. They prefer sandy or gravelly porous soil and a sunny position; in rich garden soil they grow more rampant, but do not bloom so well. They should be sown where they are to stand, as they do not bear transplanting well, or if this is not feasible, they should be sown singly in small pots and the plants then planted out in their permanent places. Propagation is by seeds sown in spring after the danger from frost has passed; by greenwood cuttings under glass; or by cuttings of nearly mature wood in early summer in a coldframe under glass, forming roots the following spring. Varieties and rarer kinds are sometimes grafted in spring in the greenhouse on *U. europæus*.

europæus, Linn. FURZE. GORSE. WHIN. Fig. 3876. Much-branched very spiny rigid shrub, 2–4 ft. high: branchlets striped, villous when young: lvs. scale-like or narrow-lanceolate, pubescent: fls. axillary, 1–3, crowded at the end of the branches and forming racemes; corolla bright yellow, about ¾in. long, fragrant; calyx yellow, hairy: pod oblong, over ½in. long, villous, dark brown. April, June and often again in Sept., Oct.; in Calif. almost the whole year. W. and S. Eu; naturalized in waste places in the Middle Atlantic states and also on Vancouver Isl. S.E.B. 3:323. R.F.G. 22:2068. G.W. 17, p. 285.—There is a variety with double fls., var. **plènus,** Schneid. (var. *flòre-plèno*, Loud.). Gn. 63, p. 441. G.M. 52:393. Another variety is var. **strictus,** Webb, of upright, pyramidal habit and less spiny, but as it does not bloom freely, it is of little value.

nànus, Forst. Dwarf shrub of dense habit, similar to the preceding species, but smaller in every part, less rigid and with slenderer spines: fls. about ½in. long, with the wings straight and shorter than the keel; calyx slightly downy, not hairy: pod ½in. long, nearly inclosed in the calyx. Autumn. W. Eu., England to Spain. S.I.F. 3:325. R.F.G. 22:2068, 3.

ALFRED REHDER.

ULLÙCUS (native name). *Chenopodiàceæ;* Volkens in Engler's Pflanzenfamilien places this in *Basellàceæ*. Fleshy perennial herbs, decumbent and climbing, grown in Peru and Chile for the tubers: rhizomes creeping, roots tuber-bearing: sts. angulate: lvs. alternate, thick, petioled, rotund-cordate: fls. hermaphrodite, in axillary, large, lax-fld. racemes, golden yellow; perianth rotate, 5-parted, tube very short; stamens 5; ovary minute: fr. ovoid, berry-like.—One species, Peru, Bolivia, and Chile. **U. tuberòsus,** Caldas. ULLUCO or OLLUCO. Description same as generic. B.M. 4617. G.C. II. 23:216. H.F. 2:48. J.F. 3:221. The tubers, produced near the base of the plant underground, are much eaten in S. Amer. Sometimes the plant is cult. in northern countries, but only as a curiosity. It is prop. by the tubers, as are potatoes.

3877. Elm fruits. *1*, Ulmus americana; *2*, U. racemosa; *3*, U. alata; *4*, U. fulva; *5*, U. glabra. (×2)

ULMÀRIA: *Filipendula.*

ÚLMUS (ancient Latin name of the elm). *Ulmàceæ.* ELM. Ornamental trees chiefly grown for their handsome foliage and often planted as shade and street trees.

Deciduous, rarely half-evergreen: winter buds conspicuous, with imbricate scales: lvs. short-petioled, usually unequal at the base, with caducous stipules: fls. perfect or rarely polygamous, apetalous, in axillary clusters or racemes; calyx campanulate, 4–9-lobed, with an equal number of stamens; ovary superior, with a 2-lobed style, usually 1-loculed and with 1 ovule: fr. a slightly compressed dry nutlet, with a broad rarely narrow membranous wing all around (Fig. 3877).—About 18 species of Ulmus are known, distributed through the colder and temperate regions of the northern hemisphere, in N. Amer. south to S. Mex., but none west of the Rocky Mts., and in Asia south to the Himalayas. The wood is heavy, hard, and tough and often difficult to split. It is especially useful in the manufacture of wagon-wheels, agricultural implements, and for boat-building. The inner mucilaginous bark of the branches of *U. fulva* is used medicinally and that of some Chinese species is made into meal and used for food. The tough inner bark of some species furnishes a kind of bass which is sometimes woven into a coarse cloth, especially that of *U. japonica* in Japan.

The elms are mostly tall trees, rarely shrubby, with alternate usually 2-ranked, medium-sized or sometimes rather small leaves and with inconspicuous generally greenish brown flowers appearing mostly before the leaves. Most of the cultivated species are hardy North, but *U. crassifolia* and *U. alata* are tender; *U. parvifolia* and *U. serotina* are of doubtful hardiness, although they have persisted near Boston. The elms are mostly tall and long-lived and are very valuable for park planting and for avenue trees, especially *U. americana*, which is the favorite tree for street planting and as a shade tree for dwelling houses in the northeastern states. It is the most characteristic tree of this region and of characteristic beauty. Its habit is at once majestic and graceful, and the wide-spreading head, borne usually at a considerable height on a straight and shapely trunk, affords ample shade and shelter. Besides the American elm several other species are used as avenue trees, as *Ulmus fulva*, *U. racemosa*, and the European *U. campestris*, *U. hollandica*, and *U. foliacea*. Of *U. hollandica*, the vars. *belgica*, *superba*, *Klemmer* are among the best for street planting; of *U. foliacea*, the vars. *stricta*, *Wheatleyi*, and *Dampieri*. In the southern states *U. serotina*, *U. crassifolia*, and *U. alata* are sometimes used as avenue trees. There are several varieties of striking and peculiar habit, as *U. glabra* var. *fastigiata* and *U. foliacea* var. *monumentalis*, with narrow columnar head; *U. glabra* var. *pendula*, with horizontal limbs forming widespreading tiers; *U. glabra* var. *Camperdownii* with long pendulous branches. *U. foliacea* var. *umbraculifera*, with a dense, globose and rather small head, may be used as an avenue tree for formal gardens. Several species and varieties are interesting in winter on account of their branches being furnished with broad corky wings. The foliage of most species turns pale yellow in fall, but that of the European species remains green much longer.

Unfortunately many insects and fungi prey upon the elm, especially on the American elm. One of the most

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destructive is the elm leaf-beetle, which destroys the foliage. The canker-worm is also serious; to keep it from doing damage, band the trunks a few feet above the ground with cloth covered with a sticky substance, which prevents the ascent of the wingless female. The trees should be sprayed. A borer, *Saperda tridentata*, sometimes does considerable damage to the wood. The elms grow best in rich and rather moist soil, and the American elm especially requires such a soil to attain its full beauty, but some species, as *U. racemosa* and *U. alata*, do well in drier situations. Elm trees are not difficult to transplant, and rather large trees may be moved successfully if the work is done carefully. They bear pruning well, but generally do not need much attention of this kind. Propagation is by seeds ripening usually in May or June and sown at once. Most of the seeds will germinate after a few days, but some remain dormant until the following spring. Increased also by layers, which are usually put down in autumn and are fit to be removed in one year. A moist and rather light soil is best for this method. Trees raised from layers are said to bear seed less early and less profusely and are therefore especially recommended for street trees, as the foliage of trees that fruit slightly or not at all is larger and more abundant. Dwarf forms of *U. foliacea* and also *U. parvifolia* and *U. pumila* may be raised from greenwood cuttings under glass, the cuttings growing most readily if taken from forced plants. *U. campestris*, *U. foliacea*, and some of their varieties are also propagated by suckers. In nurseries most of the varieties are propagated by grafting, either by budding in summer or by whip- or splice-grafting in spring outdoors or on potted stock in the greenhouse. *U. americana*, *U. campestris*, *U. foliacea*, and *U. glabra* are used for stocks.

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KEY TO THE SPECIES.

A. *Blooming in spring, before the lvs.: calyx not divided below the middle.*
  B. *Fls. on slender pedicels, drooping: fr. ciliate.*
    C. *Fr. glabrous except the ciliate margin: branches not corky: margins of lvs. ciliate.*
      D. *Lvs. widest above the middle, densely pubescent beneath: buds elongated, pointed*..... 1. **lævis**
      DD. *Lvs. widest about the middle, more or less pubescent beneath: buds ovoid, obtusish or acute.* 2. **americana**
    CC. *Fr. pubescent: branches usually more or less corky.*
      D. *Margin of lvs. not ciliate; lvs. about 3 in. long, without axillary tufts beneath: buds pubescent*..... 3. **racemosa**
      DD. *Margin of lvs. minutely ciliate; lvs. about 2 in. long, with axillary tufts beneath: buds glabrous*..... 4. **alata**
  BB. *Fls. short-pedicelled, in dense clusters, not pendulous.*
    C. *Buds covered with rusty hairs, obtuse: branchlets scabrous with minute tubercles: lvs. ciliate: fr. pubescent in the middle*..... 5. **fulva**
    CC. *Buds pale pubescent or glabrous: branchlets smooth: lvs. not ciliate: fr. glabrous.*
      D. *Lvs. doubly serrate, unequal at the base, 2–7 in. long.*
        E. *Young branchlets pubescent: lvs. scabrous above.*
          F. *Fr. with the seed in the center, about ¾ in. broad: petioles short, about ⅛ in. long.*
            G. *Mature branchlets reddish brown, hairy while young: lvs. only occasionally 3-lobed*... 6. **glabra**
            GG. *Mature branchlets pale yellowish or grayish brown, glabrous or nearly so while young: lvs. usually 3-lobed at the apex* ..... 7. **laciniata**
          FF. *Fr. with the seed near the apex, ½ in. broad or less: petioles ⅛–¼ in. long.*
            G. *Lvs. broadly oval or ovate, 2–3 in. long: branchlets not corky*... 8. **campestris**
            GG. *Lvs. obovate or elliptic, 3–4 in. long: branchlets often with corky wings.* 9. **japonica**
        EE. *Young branchlets glabrous or with few scattered hairs: lvs. smooth or nearly so above: fr. with the seed above the middle.*
          F. *Length of lvs. 3–5 in.; petioles ¼–½ in. long*.... 10. **hollandica**
          FF. *Length of lvs. 2–3½ in.; petioles ¼–½ in. long*.... 11. **foliacea**
      DD. *Lvs. simply serrate, nearly equal at the base, 1–2 in. long*.. 12. **pumila**
AA. *Blooming in the axils of this year's lvs. in summer or autumn: calyx divided below the middle.*
  B. *Lvs. simply serrate, small: fr. glabrous*..... 13. **parvifolia**
  BB. *Lvs. doubly serrate: fr. pubescent.*
    C. *Racemes 3–5-fld.: lvs. 1–2 in. long, obtuse or acute*..... 14. **crassifolia**
    CC. *Racemes many-fld.: lvs. 2–3 in. long, acuminate*..... 15. **serotina**

1. **lævis**, Pall. (*U. pedunculàta*, Foug. *U. effùsa*, Willd. *U. ciliàta*, Ehrh. *U. racemòsa*, Borkh., not Thomas). Tree, attaining 100 ft., with spreading branches, forming a broad open head: branchlets pubescent, usually until the second year: buds glabrous, acute: lvs. oval or obovate, very unequal at base, acuminate, sharply doubly serrate, usually glabrous above, pubescent beneath, 2–4 in. long: fls. slender-pedicelled; calyx with 6–8 exserted stamens: fr. ovate, notched, the incision not reaching the nutlet. Cent. Eu. to W. Asia. H.W. 2:39, p. 9. I.T. 6:220. R.F.G. 12:666.—Rarely cult., and with less valuable wood. The trunk and the limbs are, as in the American elm, often clothed with short branchlets.

2. **americàna**, Linn. (*U. álba*, Raf.). WHITE ELM. WATER ELM. AMERICAN ELM. Figs. 3877, 3878, 3879.

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Tall and wide-spreading tree, attaining to 120 ft., usually with high light gray trunk, limbs gradually outward-curving with pendulous branches: branchlets pubescent when young, glabrous in fall: buds acutish, glabrous: lvs. ovate-oblong, unequal at the base, acuminate, doubly serrate, pubescent when young, at length glabrous and rough above, pubescent or almost glabrous beneath, 3–6 in. long: fls. in many-fld. clusters; stamens 7–8, exserted: fr. oval or elliptic, veined,

3878. Ulmus americana. (×¼)

deeply notched, incision reaching to the nutlet. Newfoundland to Fla., west to the base of the Rocky Mts. S.S. 7:311. Em. 2:322. G.F. 3:443, 467; 6:175. Mn. 7, p. 125; 8, p. 71. F.E. 15:86, pl. 46. F.S.R. 1, p. 195. V. 14:79; 20:10. M.D.G. 1900:392–4.—One of the favorite avenue trees in the northeastern states. The elm varies considerably in habit, and the following forms have been distinguished. In the "vase form" the main trunk separates at 15–30 ft. into several almost equal branches, which diverge at first slightly and gradually, but at the height of 50–70 ft. sweep boldly outward and form a broad flat head, with the branches drooping at the extremities. This is the most beautiful and also the commonest form. The "plume form" is much like the foregoing, but the trunk is less divided and the limbs are clothed with short branchlets, thus forming feathery plumes. The "weeping-willow form" usually has a rather short trunk with limbs curving outward more rapidly and with long and very slender pendulous branches, forming usually a broad and round head. The "oak-tree form" is distinguished by its limbs spreading abruptly and in sharp turns and the branches being usually less pendulous. The name "feathery" or "fringed" elm is applied to trees which have the limbs and the main trunk clothed with short somewhat pendent branchlets thrown out usually in clusters at short intervals. This may appear in any of the forms named, but is most conspicuous in trees of the plume form. (Fig. 3879.) There are a few named varieties in nurseries: Var. **aûrea,** Temple, with yellow foliage, found in Vt., by F. L. Temple; var. **péndula,** Ait., with slender pendulous branches; this is the "weeping-willow form" described above.

3. **racemòsa,** Thomas, not Borkh. (*U. Thómasii,* Sarg.). Cork Elm. Rock Elm. Fig. 3877. Tree, attaining 100 ft., with short spreading branches, forming an oblong round-topped head: branchlets pubescent usually until the second year and mostly irregularly corky winged when older: buds acute, pubescent: lvs. oval to oblong-obovate, unequal at the base, shortly acuminate, sharply and doubly serrate, glabrous or somewhat rough above, pubescent beneath, 2–4 in. long: fls. in slender pendulous racemes; calyx with 5–8 exserted stamens: fr. oval or obovate, with a shallow notch at the apex, pale, pubescent, ½–¾in. long. Que. to Tenn., west to Neb. S.S. 7:312.

4. **alàta,** Michx. Wahoo or Winged Elm. Fig. 3877. Tree, attaining 50 ft., with spreading branches forming an oblong, round-topped or rather open head: branches usually with 2 opposite very broad wings; branchlets almost glabrous: buds acute, glabrous: lvs. ovate-oblong to oblong-lanceolate, often falcate, acute or acuminate, doubly serrate, subcoriaceous, glabrous above, pubescent beneath, 1½–2½ in. long: fls. in short, few-fld. racemes; stamens usually 5: fr. elliptic-ovate, with narrow wing and with 2 incurved horns at the apex, villous, ½in. across. Va. to Fla., west to Ill. and Texas. S.S. 7:313.—Handsome round-headed tree, sometimes used as an avenue tree in the southern states; not hardy N.

5. **fúlva,** Michx. (*U. rùbra,* Michx. *U. elliptica,* Hort., not Koch. *U. Heÿderi,* Spaeth. *U. sibirica,* Hort.). Slippery Elm. Red Elm. Figs. 3877, 3880. Tree, attaining 70 ft., with spreading branches, forming usually a broad, open, flat-topped head: branchlets pubescent and scabrous with minute tubercles: lvs. obovate to oblong, very unequal at base, long-acuminate, doubly serrate, of firm texture, very rough above, pubescent beneath, 4–7 in. long: fls. in dense clusters; stamens 5–9: fr. orbicular-oval, little notched at the apex, ½in. across. Que. to Fla., west to Dakotas and Texas. S.S. 7:314. Em. 2:334.—The reddish brown pubescence of the bud-scales is very conspicuous in spring, when the buds are unfolding.

6. **glàbra,** Huds. (*U. scàbra,* Mill. *U. montàna,* With.). Wych Elm. Scotch Elm. Fig. 3877. Tree, to 120 ft., with spreading branches forming an oblong or broad round-topped head; without suckers: bark remaining smooth for many years (hence its Latin specific name): branches never with corky wings; young branchlets pubescent: buds obtuse, ciliate, and pubescent with yellowish brown hairs: lvs. very short-petioled and unequal at base, broadly obovate to oblong-obovate, abruptly acuminate or sometimes 3-lobed at the apex, sharply and doubly serrate, rough above, pubescent beneath, 3–6 in. long: fls. clustered; stamens 5–6, little exserted: fr. oval or roundish obovate, little notched at the apex, with the seed in the middle, ¾–1 in. long. Eu. to Japan. H.W. 2:38, pp. 7, 8. F.S.R. 3, pp. 269, 271, 272. G.C. III. 39:152, suppl. S.E.B. 8:1287.—A variable species of which many forms are cult.: Var. **grandidentàta,** Moss (*U. scàbra tricúspis,* Koch. *U. triserràta* or *trìdens,* Hort.). Lvs. 3-lobed at the apex, particularly on vigorous shoots: young branchlets pubescent, reddish brown in autumn. Var. **crìspa,** Rehd. (*U. montàna crìspa,* Loud. *U. crìspa,* Willd. *U. aspleniifòlia,* Hort.). Slow-growing form with narrow lvs. incisely serrate with incurved twisted teeth. Var. **atropurpûrea,** Rehd. (*U. montàna atropurpùrea,* Spaeth). Lvs. dark purple and folded. Var. **lutéscens,** Rehd. (*U. montàna lutéscens,* Dipp.). Lvs. yellow. Var. **rûbra,** Rehd. (*U. campéstris rùbra,* Simon-Louis. *U. montàna libro rùbro,* Planch.). Inner bark of the young branchlets deep red. Var. **fastigiàta,** Rehd. (*U. montàna fastigiàta,* Loud. *U. pyramidàlis,* Hort. *U. plumòsa pyramidàlis,* Hort. *U. exoniénsis,* Hort. *U. Fórdii,* Hort.). Columnar form with strictly upright branches: lvs. rather small, dark green, obovate, wrinkled above and somewhat twisted. Var. **péndula,** Rehd. (*U. montàna péndula,* Loud. *U. montàna horizontàlis,* Kirchn.). Branches horizontally spreading forming a flat-topped head, branchlets pendulous. Gn. 17, p. 539; 77, p. 385. G.C. III. 50:221. M.D.G. 1901: 163. G.M. 49:749. G.L. 20:431. Var. **Camperdòwnii,** Rehd. (*U. Camperdòwnii,* Hort. *U. montàna péndula Camperdòwnii,* Henry. *U. montàna péndula,* Hort., not Loud.). Camperdown Elm. Figs. 3881, 3882. Branches and branchlets pendulous, forming a round head. Gn. 40, p. 158. G.C. III. 50:221. G.W. 2, p. 33; 8, p. 352; 15, p. 662. Var. **nàna,** Rehd. (*U. montàna nàna,* Simon-Louis). Dwarf slow-growing form with

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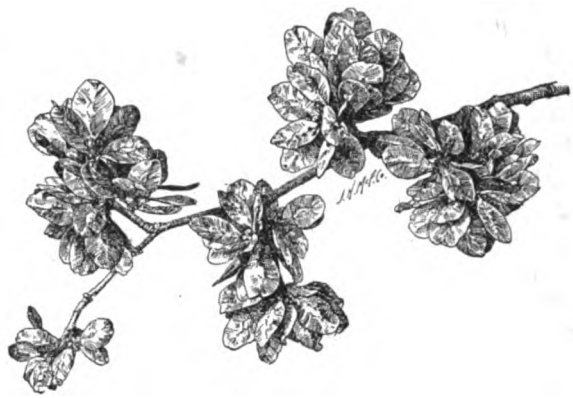
horizontal branches, stunted branchlets, and small lvs., forming a hemispherical bush. Forms of *U. glabra* are frequently planted in the East.

7. **laciniàta,** Mayr (*U. montàna* var. *laciniàta,* Trautv. *U. màjor* var. *heterophýlla,* Maxim.). Tree, usually not exceeding 30 ft., but occasionally taller: branchlets sparingly hairy or glabrous, finally pale yellowish brown or grayish brown, older branches brown: lvs. obovate or obovate-oblong, at the broad apex usually with 3, sometimes with 5 lobes, very unequal and semi-cordate at the base, doubly serrate, rough above, pubescent beneath at least on the veins, 3–7 in. long; petioles pubescent, very short, about ⅛in. long: fls. in clusters, short-stalked: fr. elliptic, glabrous, ¾in. long, with the seed in the middle. Manchuria, N. China, Japan. S.I.F. 2:15.—This species has been sometimes confused with *U. glabra* var. *grandidentata,* but is easily distinguished by the pale color of the mature branchlets glabrous or slightly pubescent while young and by the presence of 3-lobed lvs. even on the fruiting branchlets of mature trees, while in the variety of *U. glabra* the mature branchlets are reddish brown and quite hairy while young and the 3-lobed lvs. appear chiefly on vigorous shoots.

8. **campéstris,** Linn. (*U. pròcera,* Salisb. *U. satìva,* Mill., according to Henry. *U. suberòsa,* Smith. *U. surculòsa* var. *latifòlia,* Stokes). English Elm. Tall tree, to 130 ft. high, with a straight st. and spreading or ascending branches forming an oval head; usually suckering abundantly: bark deeply fissured: young branchlets pubescent: buds ovoid, minutely pubescent: lvs. broadly oval or ovate, short-acuminate, very oblique at the base, dark green and scabrous above, soft-pubescent beneath and with axillary tufts of hairs, 2–3 in. long; pairs of veins about 12; petioles ⅛in. long, pubescent: fls. short-stalked with 3–5 stamens: fr. nearly orbicular, ½in. across, with a short closed notch at the apex, seed touching the base of the notch. England, W. and S. Eu. F.S.R. 2, p. 267. S.E.B. 8:1285. Em. 2:336. M.D.G. 1900:577.—This is the most stately of the European elms and much planted in England; the famous "Long Walk" in Windsor Park consists of this elm. This tree is sometimes planted as an avenue tree in this country; it succeeds very well and fine old trees may be seen occasionally in the northeastern states. The foliage remains green several weeks longer than that of the American elm. The form of S. Eu. has been distinguished as var. **austràlis,** Henry. Pyramidal tree: lvs. thicker and firmer; more cuspidate-acuminate, with the veins more prominent beneath: fr. more obovate. There are also several garden forms. Var. **variegàta,** Dipp. (var. *argénteo-variegàta,* Hort.). Lvs. striped and spotted with white. Var. **purpùrea,** Kirchn. Lvs. tinged purple, 2–2½ in. long. Var. **purpuráscens,** Schneid. (var. *myrtifòlia purpùrea,* L. de Smet). Lvs. tinged purplish, about 1 in. long. Var. **Van Houttei,** Schneid. (var. *Louis Van Houtte*). Lvs. tinged with yellow. Var. **Berárdii,** Simon-Louis. Bushy tree or shrub with slender upright branches: lvs. oblong, with few coarse teeth, nearly glabrous, ½–1 in. long. Var. **viminàlis,** Loud. (*U. antárctica,* Kirchn. *U. stricta,* Hort.). Tree with ascending branches and pendulous slightly pubescent branchlets: lvs. obovate to narrowly elliptic, incisely doubly serrate, acuminate, scabrous above and slightly pubescent beneath, 1–2½ in. long. G.C. III. 51:236. Var. **viminàlis aùrea,** Henry (*U. Rosseèlsii,* Koch. *U. campéstris aùrea,* Morr. Var. *antárctica aùrea,* Nichols.). Like the preceding but with yellow lvs. B.H. 16:19. I.H. 14:513. Var. **viminàlis marginàta,** Kirchn. (var. *viminàlis variegàta,* Nichols.). Like var. *viminalis,* but lvs. variegated with white. Var. **Wéntworthii,** Schelle (*U. Wéntworthii péndula,* Hort.). A form with pendulous branches.

3879. A feathered elm.—Ulmus americana.



3880. Fruit of slippery elm.—Ulmus fulva. (× ½)

9. **japónica,** Sarg. (*U. campéstris* var. *japónica,* Rehd.). Tree, to 100 ft., with a broad head and often more or less pendulous branchlets: young branchlets densely pubescent and rough with minute tubercles, pale yellowish brown, sometimes developing corky ridges: lvs. obovate or elliptic, acuminate, oblique at the base, scabrous and hairy above, pubescent beneath with slight axillary tufts of hairs, 3–5 in. long; pairs of veins 12–16; petiole ⅛–¼in. long, densely pubescent: fls. nearly sessile, tetramerous: fr. obovate-oblong, about ¾in. long, gradually narrowed toward the base, with an open notch at the apex; seed touching the notch. Japan, Manchuria, Amurland. G.F. 6:327. S.T.S. 2:101.—Intro. into the Arnold Arboretum in 1895; it has proved perfectly hardy there, grows rapidly, and promises to become a valuable ornamental tree.

10. **hollándica,** Mill. (*U. Dippelìana,* Schneid. *U. glàbra* × *U. foliàcea*). Under this name are united here a number of elms which are apparently hybrids between the Scotch elm and the smooth-leaved elm. They are more or less intermediate between the parents, in some forms resembling the first, in others the second parent. As the type of this collective group the following variety may stand, as it is probably not different from Miller's *U. hollandica.* Var. **màjor,** Rehd. (*U. màjor,* Smith. *U. scàbra* var. *màjor,* Gürke. *U. campéstris* var. *màjor,* Planch.). Dutch Elm. Tree, to 100 ft. or more, with a short trunk and wide-spreading branches, suckering: bark of trunk deeply fissured: young branchlets glabrous or with few hairs: buds ovoid, minutely pubescent: lvs. broadly oval, acuminate, very unequal at the base, dark green, lustrous and nearly smooth above, sparingly and minutely pubescent and glandular beneath, with conspicuous axillary tufts, 3–5 in. long; pairs of veins 12–14; petiole ¼in. or slightly longer: fls. mostly 4-merous: fr. oval-obovate, ¾–1 in. long; seed touching the base of the notch. R.F.G. 12:665. Var. **végeta,** Rehd. (*U. végeta,* Lindl. *U. glàbra* var. *végeta,* Loud. *U. Húntingdonii,* Hort.). Huntingdon Elm. Tall tree with rough bark and forked st.; suckering: young branchlets stout, glabrous or sparingly hairy: lvs. oval, acuminate, very unequal at the base, smooth and glabrous above, glabrous below except small axillary

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tufts, 3½–5 in. long; pairs of veins 14–18; petiole ¼in. or slightly longer: fr. oval-obovate, with closed notch; seed above the center. Var. **péndula,** Rehd. (*U. Smithii,* Henry. *U. glàbra* var. *péndula,* Loud.). DOWNTON ELM. Tree with ascending branches and long pendulous branchlets more or less pubescent when young: lvs. oval, firm, long-acuminate, very unequal at the base, glabrous and smooth above, sparingly pubescent beneath, about 3½ in. long; petiole ⅛in. long, pubescent: stamens 3–5: fr. obovate, ¾in. long, with open notch; seed above the center. Var. **bélgica,** Rehd. (*U. bélgica* Burgsd. *U. batavìna,* Koch. *U. latifòlia,* Poederle. *U. campéstris* var. *latifòlia,* Gillekens). BELGIAN ELM. Tall tree with a straight rough-barked st. and a broad crown: young branchlets more or less pubescent: lvs. obovate-elliptic, very oblique at the base, slightly scabrous above, soft-pubescent beneath, 3–5 in. long, with 14–18 pairs of veins; petioles ⅛–⅕in. long: fr. nearly 1 in. with the seed slightly above the middle. Much planted in Belgium and Holland. Var. **Dumóntii,** Rehd. (*U. bélgica* var. *Dumóntii,* Henry. *U. campéstris* var. *Dumóntii,* Mott.). Similar to the preceding variety with more ascending branches forming a narrower more pyramidal head. Var. **Klémmer,** Rehd. (*U. campéstris* var. *Klémmer,* Gillekens. *U. campéstris Clémmeri,* Hort. *U. Klémeri,* Spaeth). Tall tree with a smooth-barked st. and ascending branches forming a narrow pyramidal head: young branchlets with short hairs: lvs. ovate, short-acuminate, glabrous, but scabrous above, minutely pubescent beneath, about 3 in. long; pairs of veins about 12: fr. with the seed close to the notch at the apex. Tree of rapid growth much planted in Belgium. Var. **supérba,** Rehd. (*U. montàna supérba,* Spaeth, also of Morr.? *U. supérba,* Henry. *U. præstans,* Schoch). Narrow pyramidal tree with smooth bark and ascending branches: young branchlets glabrous: lvs. obovate or obovate-elliptic, very oblique at the base, glabrous and smooth above, glabrous below except small axillary tufts, with 15–18 pairs of veins, 3–5 in. long; petioles ¼–½in. long, sparingly pubescent: fls. 5-merous. Var. **Pitteùrsii,** Rehd. (*U. Pitteùrsii,* Kirchn. "Orme Pitteurs," Morr.). Vigorous-growing tree with large lvs. similar to *U. glabra,* to 8 in. long, broadly ovate, said to produce annual shoots to 9 ft. long. B.H. 2, pp. 133, 136.

11. **foliàcea,** Gilib. (*U. nìtens,* Moench. *U. glàbra,* Mill., not Huds. *U. campéstris* var. *lævis,* Spach. *U. campéstris* var. *glàbra,* Hartig. *U. surculòsa* var. *glàbra,* Stokes). SMOOTH-LEAVED ELM. Tree, with straight trunk, wide-spreading branches and usually

3881. Camperdown elm.—Ulmus glabra var. Camperdownii.

pendulous branchlets; suckering: bark gray, deeply fissured: young branchlets glabrous or nearly so: buds minutely pubescent: lvs. oval or obovate, acuminate, very unequal at the base, lustrous and smooth above, with white axillary tufts beneath and glandular, sparingly and minutely pubescent at first, doubly serrate, not ciliate, 2–3½ in. long; pairs of veins about 12; petiole ¼–½in. long: fls. 4–5-merous: fr. obovate, cuneate at the base, broad and rounded at the apex; the seed nearly touching the closed notch at the apex. Eu., N. Afr., W. Asia. S.E.B. 8:1286 (as *U. suberosa glabra*). R.F.G. 12:664. H.W. 2:37, p. 3 (as *U. campestris*).—A variable species with several geographical varieties and a number of garden forms. Var. **suberòsa,** Rehd. (*U. suberòsa,* Moench, not Ehrh.

3882. Ulmus glabra var. Camperdownii. (×⅓)

U. campéstris suberòsa, Wahl.). Branches with corky wings. R.F.G. 12:663. Var. **propéndens,** Rehd. (*U. glàbra propéndens,* Schneid. *U. microphýlla péndula,* Hort. *U. suberòsa péndula,* Hort.). With pendulous branchlets, and small lvs. about 1 in. long. M.D.G. 1901:166. Var. **itálica,** Rehd. (*U. nìtens* var. *itálica,* Henry). Similar to the typical form, but lvs. more coriaceous, with 14–18 pairs of veins, quite glabrous at maturity except conspicuous axillary tufts beneath; petioles ¼in. long. Italy, Spain, Portugal. Var. **umbraculífera,** Rehd. (*U. campéstris umbraculífera,* Trautv. *U. dénsa,* Litwinow). Tree, with dense globose head, otherwise like the type. Persia, Armenia. Gt. 30:1034. M.D.G. 1900:579. M.D. 1910, pp. 72, 73. Var. **grácilis,** Rehd. (*U. campéstris umbraculífera grácilis,* Spaeth). Similar to the preceding but with a more ovoid, not globose head, and smaller lvs. Var. **Koòpmannii,** Rehd. (*U. campéstris Koòpmannii,* Hort. *U. Koòpmannii,* Spaeth). Closely allied to var. *umbraculifera,* but with a dense oval head: branchlets paler: lvs. ovate, 1–1¼ in. long. Var. **Ruepéllii,** Rehd. (*U. campéstris Ruepéllii,* Spaeth). Similar to var. *umbraculifera,* but branchlets pubescent and branches slightly corky: lvs. rather small, scabrous above. Var. **stricta,** Rehd. (*U. stricta,* Lindl. *U. nìtens* var. *stricta,* Henry. *U. campéstris* var. *cornubiénsis,* Loud.). CORNISH ELM. Narrow pyramidal tree with ascending branches: young branchlets often pubescent at the insertion of the lvs.: buds glabrous: lvs. obovate to oval, somewhat unequal at the base, 2–2½ in. long, glabrous and smooth above; petioles ⅛in. long: fls. usually 4-merous: fr. ⅔in. long, narrower than in the type. S. W. England. Var. **Whèatleyi,** Rehd. (*U. nìtens* var. *Whèatleyi,* Henry. *U. campéstris Whèatleyi,* Simon-Louis. *U. sarniénsis,* Lodd. *U. campéstris monumentàlis,* Hort., not Ruiz). WHEATLEY, JERSEY, or GUERNSEY ELM. Narrow pyramidal tree with ascending branches: lvs. similar to those of the preceding variety, but broader, with less conspicuous axillary tufts and glandular beneath and on the petiole. G.C. III. 41:150. M.D. 1910, p. 273. Var. **monumentàlis,** Rehd. (*U. campéstris monumentàlis,* Ruiz). Columnar tree with few upright branches and numerous short branchlets: lvs. crowded, rather short-petioled, dark green and somewhat rough above. Var. **Dampièri,** Rehd. (*U. nìtens* var. *Dampièri,* Henry. *U. campéstris Dampièri,* Spaeth). Fastigiate tree, forming a narrow pyramidal head: lvs. crowded on short branchlets.

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broadly ovate, 2–2½ in. long, glabrous. Var. **Wrèdei,** Rehd. (*U. campéstris Dampièri Wrèdei,* Hort. *U. Wrèdei aùrea,* Hort.). Like the preceding, but lvs. yellowish. M.D.G. 1898:160. Var. **péndula,** Rehd. (*U. nìtens* var. *péndula,* Henry). With slender pendulous branches. Var. **Webbiàna,** Rehd. (*U. campéstris Webbiàna,* Lee). Pyramidal tree with ascending branches: lvs. folded longitudinally. Var. **variegàta,** Rehd. (*U. campéstris variegàta,* Dum.-Cours. *U. campéstris* var. *argénteo-variegàta,* Rehd.). Lvs. variegated with white, smooth above.

12. **pùmila,** Linn. (*U. microphýlla,* Pers. *U. sibírica,* Hort.). Small tree or shrub, with slender pubescent, sometimes pendulous branches: lvs. oval-elliptic to elliptic-lanceolate, short-petioled, acute, firm, dark green and smooth above, pubescent when young beneath, ¾–3 in. long: fls. short-pedicelled; stamens 4–5, with violet anthers: fr. obovate, with the nutlet somewhat above the middle, incision at the apex reaching about half-way to the nutlet. Turkestan to Siberia and N. China. Gn. 65, p. 133.—A graceful small hardy tree. **Var. arbòrea,** Litwinow (*U. pinnàta-ramòsa,* Dieck. *U. turkestánica,* Regel). Tree with long, pinnately branched shoots pubescent when young: lvs. oblong-lanceolate, 1–2½ in. long; petioles pubescent at first. Var. **péndula,** Hort. (*U. parvifòlia péndula,* Hort. *Planèra rèpens,* Hort.), has slender more pendulous branches.

13. **parvifòlia,** Jacq. (*U. chinénsis,* Pers.). CHINESE ELM. Half-evergreen small tree or shrub, with spreading pubescent branches: lvs. ovate to obovate or oblong, very short-petioled and little unequal at base, acute or obtusish, subcoriaceous, simply serrate, glabrous and glossy above, pubescent beneath when young, usually glabrous at length, ¾–2 in. long: fls. short-pedicelled, in clusters; stamens 4–5, much exserted: fr. oval to elliptic, notched at the apex, with the seed in the middle, ⅓–½in. long. July–Sept. N. China, Japan. S.I.F. 1:37. R.H. 1909, pp. 398, 399. —Has proved hardy near Boston. The recently described *U. Sièboldii,* Daveau, and *U. Shirasawàna,* Daveau, are probably only forms of this species; they are said to differ in their deciduous lvs. and the former besides by the persistent deeply fissured bark, exfoliating in the other two species and the larger fr. exceeding ½in. (B.S.D. 1914: 24, 25); the latter differs in the crenate-dentate lvs. with 8–10 pairs of veins and in the contracted fr. (B.S.D. 1914: 24; also S.I.F. 1:37 represents this form).

14. **crassifòlia,** Nutt. CEDAR ELM. Tree, attaining 80 ft., with spreading limbs and slender, often pendulous branches, often furnished when older with 2 opposite corky wings: lvs. short-petioled, ovate to ovate-oblong, usually very unequal at the base, obtuse or acute, doubly and obtusely, sometimes almost simply serrate, subcoriaceous, somewhat rough and lustrous above, pubescent beneath, 1–2 in. long: fls. in 3–5-fld. very short racemes; stamens 5–8, little exserted: fr. oval-elliptic, pubescent, notched, ⅓in. long. Aug. Miss. to Ark. and Texas. S.S. 7:315. —Tender N.

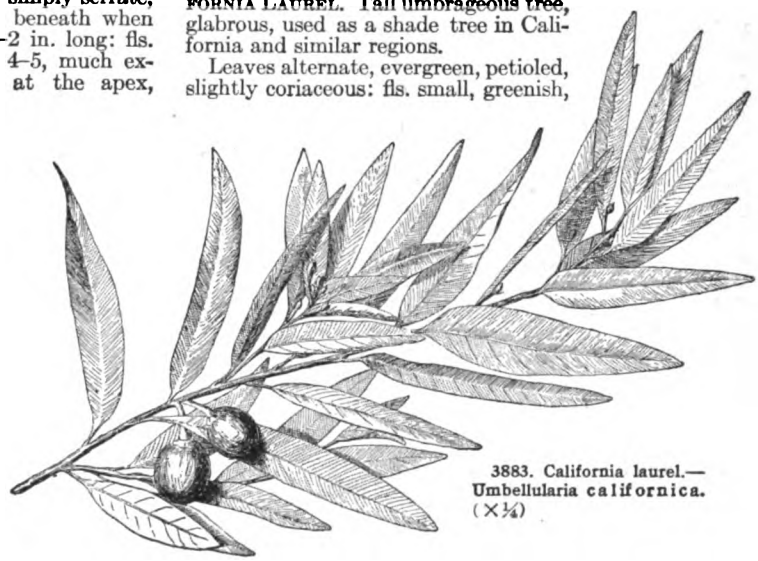
15. **serótina,** Sarg. Tree, with short spreading and pendulous branches, often furnished with irregular corky wings: lvs. oblong to obovate, unequal at the base, acuminate, doubly serrate, glabrous and lustrous above, pubescent on the veins beneath, 2–3 in. long: fls. in 1–1½-in.-long pendulous racemes; calyx 5–6-parted to the base: fr. elliptic, deeply notched, densely ciliate, ½in. long. Sept. Tenn. to Ga.; sometimes planted in avenues in Ga. (S.S. 14:718); has proved hardy at the Arnold Arboretum, Boston.

U. arbúscula, Wolf (U. glabra × U. pumila). Shrubby tree: lvs. elliptic to elliptic-oblong, doubly serrate, nearly equal at the base, ¾–3 in. long, on shoots to 6 in. long. Originated in St. Petersburg. —*U. Bergmanniàna,* Schneid. Allied to U. glabra. Tree, to 50 ft.: branchlets glabrous: lvs. obovate-oblong to elliptic, acuminate, doubly serrate, glabrous, 2½–5 in. long; petioles very short: fr. roundish-obovate, glabrous, ½–¾in. long. Cent. China. Var. *lasiophýlla,* Schneid. Lvs. pubescent beneath. W. China.—*U. Davidiàna,* Planch. Allied to U. japonica. Medium-sized tree: young branchlets glabrous, later pale grayish brown or pale brown: lvs. short-petioled, obovate or elliptic ovate, doubly serrate, slightly pubescent beneath, 2–4½ in. long: fr. pubescent in the middle, but glabrous toward the margin. N. China.—*U. elliptica,* Koch. Allied to U. glabra. Branchlets pubescent: lvs. elliptic to elliptic-oblong, glabrous and nearly smooth above, slightly pubescent beneath, 3½–6 in. long: fr. obovate, with the seed in the pubescent middle. Transcaucasia, Armenia. The plant cult. under this name is U. fulva.—*U. Kedkii,* Sieb.=Zelkova serrata.—*U. macrocárpa,* Hance. Small tree or shrub: young branchlets pubescent, later pale brown, often with 2 corky wings: lvs. ovate, coarsely doubly serrate, rough above, slightly pubescent or nearly glabrous below, 1½–3 in. long: fr. obovate, with the nutlet in the middle, pubescent and ciliate, about 1 in. long. N. China. Possibly U. rotundifolia, Carr. (R.H. 1868, p. 374), belongs here.—*U. minor,* Mill. (U. surculosa var. argutifolia, Stokes. U. sativa, Moss, not Mill. U. Plotii, Druce). Allied to U. foliacea. Suckering tree, to 90 ft., with ascending branches and pendulous branchlets: lvs. obovate or elliptic, dull and slightly scabrous above, pubescent beneath at first, 1½–2½ in. long; petioles ⅛in. long: fr. narrowly obovate, ½in. long. Eu. G.C. III. 50:408, 409; 51:235. R.F.G. 12:660.—*U. Plòtii,* Druce=U. minor.—*U. sativa,* Moss=U. minor. —*U. Verschaffèltii,* Hort.=Zelkova Verschaffeltii.—*U. Wilsoniàna,* Schneid. Tree, to 50 ft.: young branchlets pubescent, later brown and often corky: lvs. elliptic or elliptic-obovate, doubly serrate, smooth above, finely pubescent or nearly glabrous beneath, 1½–4 in. long: fr. obovate with the nutlet near the apex, glabrous, about ¾in. long. Cent. China.

ALFRED REHDER.

UMBELLULÀRIA (from Latin *umbella,* a sunshade; referring to form of inflorescence). *Lauràceæ.* CALIFORNIA LAUREL. Tall umbrageous tree, glabrous, used as a shade tree in California and similar regions.

Leaves alternate, evergreen, petioled, slightly coriaceous: fls. small, greenish, in simple pedunculate umbels, which in the bud are surrounded by an involucre of 6 caducous bracts; perianth-tube very short; limb with 6 segms.; stamens 9, filaments with an orange-colored gland at base, anthers opening by uplifted valves: drupe subglobose or ovoid with a hard endocarp.—One species, Calif. Prop. by seeds.



3883. California laurel.—Umbellularia californica. (×¼)

californica, Nutt. (*Oreodáphne californica,* Nees). Fig. 3883. Handsome evergreen tree, 20–30 or even 80–90 ft. high, with erect or suberect slender branches, conical outline and dense foliage: lvs. containing a highly aromatic and volatile essential oil, and burning vigorously in the campfire, even while green: fls. fragrant: drupes at first yellowish green, becoming purple when ripe. Dec. to May.—One of the most abundant and characteristic of Californian trees, common in moist

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places, particularly along streams in the Coast Range foothills and mountains, and attaining its greatest size in the cool fog-moistened alluvial valleys of the coast of N. Calif. and S. Ore.; it is but rarely seen in the drier interior valleys of the state. It often crowns the highest points of the coast-range hills, up to about 2,500 ft. altitude and far from the nearest spring or other visible sign of moisture, but in such cases the rock strata are nearly vertical and easily penetrated by the long roots which are able thus to reach hidden supplies of water. In such places it usually forms dense clumps or thickets of shrubs or small trees which are frequently shorn by the cutting ocean winds as though by a gardener's shears, suggesting its adaptability for clipped-hedge and windbreak work. It is used in boat-building, for jaws, bits, cleats, cross-trees, and the like. The branches are occasionally used for poles for chicken-roosts, as the strong odor pervading wood and bark as well as lvs., is said to keep away lice. The lvs. are used for flavoring soups and blancmanges but are too strong to give as agreeable flavor as those of *Laurus nobilis* or *Prunus Laurocerasus*. The tree is sometimes cult. for ornament in S. European parks and gardens. Sargent describes it as "one of the stateliest and most beautiful inhabitants of the North American forests, and no evergreen tree of temperate regions surpasses it in the beauty of its dark dense crown of lustrous foliage and in the massiveness of habit which make it one of the most striking features of the California landscape and fit it to stand in any park or garden."

3884. Uniola latifolia. (×¼)

JOSEPH BURTT DAVY.
F. TRACY HUBBARD.†

UMBRELLA LEAF: *Diphylleia.* **U. Pine:** *Sciadopitys.* **U. Plant** or **U. Palm:** *Cyperus alternifolius.* **U. Tree:** *Melia Azedarach* var. *umbraculiformis.*

UMBÍLICUS: *Cotyledon.*

UNGNÀDIA (named for Baron Ungnad, who in 1576 introduced the common horse-chestnut to western Europe by sending seeds to Clusius at Vienna). *Sapindàceæ.* MEXICAN BUCKEYE. Small tree or shrub which has been grown abroad in the coolhouse, but is hardy in the S. U. S., where it is used as an ornamental. Lvs. alternate, without stipules, odd-pinnate; lfts. 3–7 pairs, serrate, terminal long-petioled: fls. polygamous, irregular, aggregated in lateral fascicle or corymbose; calyx subequal, campanulate, 4–5-parted, lobes imbricate; petals 4–5, subequal, clawed, apex connate-cristate; disk 1-sided, oblique, tongue-shaped; stamens 7–10, unequal in length; ovary stipitate, ovoid, 3-celled: caps. 3-lobed, loculicidally 3-valved, leathery, cells 1-seeded; seed emetic.—One species, Texas. The seed, or "bean," has a sweet taste, but is considered emetic and poisonous. The fr. does not have a prickly husk like the horse-chestnut.

speciòsa, Endl. MEXICAN BUCKEYE. Commonly a slender deciduous shrub, 5–10 ft. high or sometimes a small tree: wood brittle: lvs. alternate, odd-pinnate; lfts. 5–7, ovate-lanceolate, acuminate. Common in S. W. Texas; winter-kills in N. Texas at a temperature of zero. S.S. 2:73. F.S. 10:1059. Gn. 19, p. 309. H.F. II. 7:231.—Intro. into Ga. at one period.

F. TRACY HUBBARD.†

UNÌOLA (an ancient Latin name of some unknown plant, derived from *unio*, unity). *Gramineæ.* Perennials with loose usually showy panicles: spikelets broad and very flat, several-fld., some of the lower lemmas empty; glumes and lemmas keeled, nerved, pointed, but awnless.—Species 5, all American. Cult. for the ornamental panicles, which are suitable for dry bouquets.

latifòlia, Michx. SPIKE-GRASS. Fig. 3884. Culms 2–4 ft.: lvs. broad and flat, often 1 in. wide: spikelets large and thin, at maturity drooping on slender pedicels, forming a very graceful and ornamental panicle. Pa. to Kans., and southward.—Often grown in hardy borders. One of the best of our hardy native perennial grasses.

paniculàta, Linn. SEA OATS. Fig. 3885. Culm taller, 4–8 ft.: lvs. narrow and convolute: spikelets narrower, upright on short pedicels, forming an elongated drooping panicle. Sand-hills along the seashore of the southern states; can be grown as far north as S. Ont. Dept. Agr., Div. Agrost., 7:271.

U. Pálmeri, Vasey, a dicœcious perennial with extensive root-stocks, growing in sand-flats along rivers of N. Mex., is harvested by the Cocopa Indians who use the grain for food. G.F. 2:403.

A. S. HITCHCOCK.

UNÒNA (in imitation of *Anona*). *Annonàceæ.* A genus based by the younger Linnæus on an American plant belonging to the previously established genus Xylopia, and afterward incorrectly applied to the Old World genus Desmos, of which it becomes a synonym. *U. discolor*, Vahl, cult. in tropical gardens for its sweet-scented fls., is identical with the

3885. Uniola paniculata.

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previously described *Desmos chinensis*, Lour.; *U. Dêsmos*, Dunal, is *D. cochinchinensis*, Lour. (see *Desmos*, in Vol. II). Belonging to other genera are Dunal's *U. uncinàta*, which is the fragrant *Artobotrys odoratissimus* of the Orient; *U. violàcea*, which is undoubtedly a species of carrion fls., Sapranthus, closely allied to *Sapranthus nicaraguensis; U. penduliflòra*, which is the aromatic ear-flower, or xochinacaztli, of the Aztecs (*Cymbopetalum penduliflorum*, Baill.); and his *U. acutiflòra* and *U. xylopioìdes* are both synonyms of the spicy *Xylopia grandiflora*, St. Hil. B. L. Robinson's *U. bibracteàta*, the fragrant "flor de guineo," which ranges from Nicaragua to Panama, and his *U. panamènsis* have been set apart by the writer under the generic name of Desmopsis. The latter has recently been rediscovered by Henry Pittier at its type locality in the Canal Zone. Both of the latter species are figured by the writer in the Bull. Torr. Bot. Club, vol. 43, pp. 183–93 (1916). See also W. E. Safford, Bull. Torr. Bot. Club. 39:501–8 (1912).

W. E. SAFFORD.

UPAS TREE: *Antiaris.*

URÀRIA (Greek *oura*, tail, referring to bracts). *Leguminòsæ.* Subshrubby perennials, adapted to the warmhouse; 1 species has been tried in S. Fla. Lvs. pinnately 3- rarely 5–7-foliate or the lower rarely all 1-foliate; lfts. usually large, stipellate; stipules free, acuminate: fls. purplish or yellowish, arranged in terminal hirsute racemes, which are sometimes elongated, sometimes dense and spike-like; calyx-lobes subulate acuminate, 2 upper teeth short, 3 lower usually elongated; standard broad; wings adhering to the obtuse keel; stamens diadelphous; ovary sessile or stipitate, few-ovuled: pod of 2–6 small, turgid, 1-seeded indehiscent joints, often placed face to face.—About 17 species, Trop. Asia, Afr., and Austral.

crinìta, Desv. Erect little-branched subshrubby perennial, 3–6 ft. high, distinguished from other species by having its upper lvs. composed of 3–7 oblong lfts. and pedicels clothed with long bristles: lfts. 4–6 x 1½–2 in.: racemes dense, 1 ft. long, 1–1½ in. thick; standard ovate, violet-purple within, pale blue outside; wings pinkish. Bengal to Assam, eastward through Burma to China, south to Malacca and the Malay Isls. to Timor Laut, but not Austral. and not indigenous in Ceylon. B.M. 7377.—Sometimes the raceme has 200 or more fls., each of which is ½in. long.

F. TRACY HUBBARD.†

URBÍNIA (named for Dr. Manuel Urbina). *Crassulàceæ.* Perennial succulent herbs, caulescent or acaulescent: lvs. closely imbricated, thick and rigid: infl. rather few-fld., cymose: calyx small, 5-lobed, lobes ovate to lanceolate, equal or unequal, much shorter than the corolla which is somewhat cone-shaped, lobes united at base into a tube; stamens 10, borne on the corolla; carpels 5. Three or 4 species, Mex. See also *Cotyledon*, Vol. II, p. 868. *U. obscùra*, Rose. Caulescent: st. about 4 in. high: lvs. ovate, about 3 x 2 in., thick but flattened, somewhat rounded at base: fl.-sts. thickish, with many narrow lvs.: infl. a 2-branched raceme: fls. about 10; calyx-teeth lanceolate; corolla about ½in. long, bright rose below, lobes slightly spreading, yellow. Habitat unknown. *U. Púrpusii*, Rose. Acaulescent: lvs. forming a very compact rosette, broadly ovate, acuminate, 1¼ in. long and nearly as broad at the base, glabrous, mottled with brown: flowering st. reddish, nearly 1 ft. high, bearing numerous small, ovate, appressed lvs.: infl. about 6-fld., in a raceme: sepals green, ovate, acute; corolla somewhat urn-shaped, pinkish outside, pale yellow inside, petals acute. S. Mex.

F. TRACY HUBBARD.

URCEÓCHARIS (from the genera Urceolina and Eucharis). *Amaryllidàceæ.* A hybrid between *Urceolina pendula* and *Eucharis grandiflora*, or in gardener's language *Urceolina aurea* and *Eucharis amazonica*. A flower of the hybrid and of each of its parents is shown in Fig. 3886. It is a tender winter-blooming bulbous plant with broad lvs. a foot long and half as wide, and large white bell-shaped 6-lobed fls. a dozen or so in an umbel, and each 2 in. across. The hybrid gets its white color from Eucharis, the fls. of Urceolina being yellow. The shape of its fl. is so singular a mixture of the two as to be very different in appearance from either. The hybrid lacks the beautiful staminal cup of Eucharis, and has a distinctly bell-shaped perianth. The showy part of Urceolina is the urn-shaped portion of the fl., the spreading tips being very short. The perianth of Eucharis is funnelform, the spreading portion being large and showy. The perianth-tube and ovary of the

3886. At the left, Eucharis grandiflora; middle, Urceolina pendula; at the right, the hybrid Urceocharis Clibranii. (All half size.)

hybrid are like those of Urceolina, the ovary being deeply 3-lobed instead of globose as in Eucharis. The pedicels are ascending, as in Eucharis, not pendulous as in Urceolina. The appendages at the base of the stamens are more distinctly marked than in either of the parents. This bigeneric hybrid was intro. to the trade under the name of *Eucharis Clibranii*, but the changes wrought in the structure of the fl. by the cross are so great that Dr. Masters was justified in giving the plant a new genus.

Clìbranii, Mast. (*Eùcharis Clìbranii*, Hort.). Tender bulbous hybrid of *Urceolina pendula* and *Eucharis grandiflora*, with petioled lvs. 1 x 1½ ft. and umbels of white bell-shaped 6-lobed fls. each 2 in. across and a dozen in an umbel, anthers depauperate. Blooms in early winter. For cult., see *Urceolina*. G.C. III. 12:215; 26:251. Gn. 44, p. 459. G.M. 35:790. G. 16:450.—Intro. about 1892 by Messrs. Clibran, Oldfield Nurseries, Altrincham, England.

edentàta, C. H. Wright. From Peru, described from a plant that bloomed in the establishment of Sander & Sons, supposed to be a natural hybrid between an Urceolina and a Eucharis; differs from *U. Clibranii* in having no teeth on the corona between the filaments. B.M. 8359.

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URCEOLÌNA (Latin, *small pitcher*, alluding to the pitcher- or urn-shaped flowers). *Amaryllidàceæ*. Bulbous herbs, used both in the greenhouse and for summer and autumn blooming out-of-doors.

Scape solid: lvs. flat, ovate, oblong or narrow, contracted to the petiole: fls. in an umbel, numerous, rather long-pedicelled; involucral bracts 2, scarious; perianth erect, finally recurved or pendulous, tube contracted above the ovary, then suddenly dilated, lobes subequal, spreading; ovary 3-celled: caps. ovoid-globose or subpyramidal, 3-angled or nearly 3-lobed.—About 3 species, S. Amer.

The species of urceolina are attractive plants and easily grown, flowering every year, but for some reason they are rather scarce. The bulbs are about 3 inches across and during the growing season have one or two leaves. The plants flower in December. After flowering the bulbs may be removed from the warmhouse to the intermediate house and placed in a spot where they will be kept dry. Just before growth begins in the spring, the bulbs should be taken out of the pots and the exhausted soil removed. The bulbs may then be replaced, one bulb in a 5-inch pot, using clean pots, plenty of drainage material and a rich light porous soil. Place the top of the bulb level with the soil. Remove the pots to the stove, and as soon as growth begins water freely. In the fall when the leaves turn yellow, water sparingly and finally withhold water altogether. The flower-scapes appear a few weeks after the leaves disappear. (Robert Cameron.)

A. *Fls. red.*

miniàta, Benth. & Hook. (*Pentlándia miniàta*, Herb.). Bulb about 1½ in. through: lvs. produced after the fls., short-petioled, about 1 ft. long, 1½ in. wide, narrowed at both ends: scape over 1 ft. long: fls. 2–6, bright scarlet. Andes of Peru and Bolivia. B.R. 25:68. R.B. 23:49.—Offered by Dutch bulb-growers.

AA. *Fls. yellow.*

péndula, Herb. (*U. aùrea*, Lindl.). Bulb about 1½ in. through: lvs. 1–2 to a st., produced after the fls., oblong, acute, 1 ft. long by 4–5 in. broad: scape about 1 ft. long: fls. 4–6, bright yellow tipped with green. Andes of Peru. B.M. 5464. G.C. III. 12:211. G. 32:241. J.H. III. 48:445.

F. W. BARCLAY.
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URECHÌTES (*tailed Echites*, alluding to the appendages of the corolla). *Apocynàceæ*. Prostrate plants or twining vines, allied to Dipladenia and having similar cultural requirements. Sts. woody or nearly so: lvs. opposite, the blades entire: fls. often showy, in axillary or terminal cymes or racemes, or sometimes only 2 together; calyx-lobes 5, long and narrow; corolla funnel-shaped, rather large, abruptly widened into a throat, 5-lobed, the lobes sometimes elongated and twisted; stamens inserted at top of the corolla-tube and included in the throat, the anthers sagittate; disk cup-shaped, 5-lobed or nearly entire: fr. comprised of 2 long spreading follicles. Species about 10, in Trop. Amer. and extending into Fla. *U. suberécta*, Muell. Arg., of Colombia, is sometimes grown in the warmhouse: somewhat woody and partially erect: lvs. ovate to elliptic: fls. large, yellow, in a terminal peduncled cyme. B.M. 1064 (as *Echites suberecta*), and 4702 (as *Dipladenia flava*).

URÈNA (from Uren, the Malabar name). *Malvàceæ*. Herbs or subshrubs of little horticultural interest: plants more or less covered with rigid stellate hairs: lvs. angled or lobed: fls. clustered; calyx 5-cleft; petals 5, often tomentose at the back, free above, connate below; staminal tube truncate or minutely toothed, anthers nearly sessile; ovary 5-celled, cells 1-ovuled: ripe carpels covered with hooked bristles or smooth, indehiscent.—About 8 or 9 species, natives of the tropics and subtropics. *U. lobàta*, Linn. Herbaceous, more or less hairy: lvs. rounded, angled, not divided beyond the middle, cordate, 5–7-lobed, lobes acute or obtuse, about 1–2 x 2–3 in.: fls. pink: carpels densely pubescent, spiny. Tropics of both hemispheres. Very variable. *U. stellípila*, Lem. Shrubby with a few elongated, fulvous-pilose branches: lvs. distant, rather short-petioled, cuneately ovate-lanceolate, base somewhat cordate, stellate, hairy, coarsely crenulate-dentate: fls. rather large, 1½ in. across, white, in axillary clusters; calyx-segms. lanceolate, acute; petals spatulate. Brazil. J.F. 3:281.

URÈRA (derivation not obvious, possibly from *uro*, to burn, alluding to the stinging hairs). *Urticàceæ*. Trees or shrubs, rarely subshrubs, with stinging hairs usually scattered, one of which has been rarely cult. as an ornamental greenhouse shrub. Lvs. alternate, entire, dentate or lobed, feather-veined or 3–5-nerved; stipules free or more or less connate in one: panicles dichotomous, cymose or irregularly racemose, unisexual: fls. diœcious or rarely monœcious; perianth of male fls. 4–5-parted, segms. ovate, stamens 4–5, ovary rudimentary; perianth-lobes or segms of female fls. 4, subequal or outer smaller, ovary straight or oblique: achenium straight or oblique, compressed or ventricose. —About 40 species, Trop. Amer., Afr., also Mascarene Isls. and Pacific islands.

alceæfòlia, Gaud. (*Urtìca caracasàna*, Jacq.). Tree or shrub: lvs. broadly ovate, acuminate, basal sinus wide and open, crenate-dentate: fls. diœcious, in regularly dichotomous cymes; male cymes 4–6 times dichotomous, stinging or not, rose-colored; female fls. many times dichotomous, the fls. solitary or in 3's. Trop. Amer.

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URGÍNEA (from the name of an Arabian tribe in Algeria). *Liliàceæ*. Bulbous herbs used both in the greenhouse and out-of-doors.

Leaves radical, sometimes very narrowly linear, sometimes broadly strap-shaped or almost oblong: scape simple, leafless: fls. in a terminal raceme, usually numerous, rather small or medium-sized, whitish, or rarely pale yellowish or rose, color more intense in the center of the segms.; bracts small, scarious; perianth finally deciduous, segms. 6, distinct, campanulate-connivent or spreading after anthesis; stamens 6; ovary sessile, 3-celled, usually 3-cornered: caps. 3-cornered, grooved, or intruded between the angles, loculicidally dehiscent.—About 75 species, Eu., Medit. region, India and Trop. and S. Afr. The sea-onion is closely related to the genus Scilla, but seems to be much closer to Ornithogalum, especially in habit, infl. and color of fls. The seeds of Urginea are numerous in each locule (in the sea-onion 10–12), strongly compressed and winged; in Ornithogalum and Scilla they are not compressed or winged and in Scilla they are solitary or few in each locule.

The sea-onion, known to apothecaries by the name of squill, and to gardens as *Urginea maritima*, is a bulbous plant native to the Mediterranean region. It has the same style of beauty as *Ornithogalum pyramidale* but unfortunately it is only half-hardy. As an ornamental plant it is little known in America. The name seems not to appear in American catalogues, but the Dutch bulb-growers offer the bulbs in different sizes. A plant erroneously called sea-onion is *Ornithogalum caudatum*. There is considerable difference of opinion as to when the sea-onion blooms, but the plant is generally considered an autumn bloomer, and it is clear that the leaves appear after the flowers. In England the plant is said to have flowered as early as July and August. Baker writes that the leaves appear in winter. Some English cultivators say the leaves appear as early as October and November; others say not until spring.

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The plant grows near the seashore and inland, in dry sandy places from the Canaries to Syria. It is also found in South Africa, which is unusual, as the North and South African species of any genus are not usually identical.

The bulbs of Urginea are collected in large quantities in the Mediterranean region for the drug trade. They sometimes attain a maximum weight of fifteen pounds. The bulbs contain about 22 per cent of sugar and are used in Sicily in the manufacture of whiskey. Squills have emetic and cathartic properties. Sirup of squills is a popular croup medicine. The bulb, as it appears in the wholesale drug market, has been deprived of its outer scales and cut into thin slices, the central portions being rejected.

Scilla, Steinh. (*U. maritima,* Baker). Sea-Onion. Squill. Height 1–3 ft.: bulb 4–6 in. thick: lvs. appearing after the fls., lanceolate, somewhat fleshy and glaucous, glabrous, 1–1½ ft. long, 2–4 in. wide above middle: racemes 1–1½ ft. long, 1–1½ in. wide, 50–100-fld.: fls. ½in. across, whitish, with the oblong segms. keeled, greenish purple. Autumn. Canaries to Syria, S. Afr. B.M. 918 (as *Ornithogalum Squilla*).—In Italy it is said to be seen often blooming in many houses on top of shelves or cupboards, the bulbs producing their long spikes of fls., which last in perfection for weeks, without earth or water.

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UROSTÍGMA: *Ficus.* The following species now in cult. abroad was not included under Ficus in Vol. III, p. 1229. **Ficus subtriplinérvia,** Mart. (*Urostigma subtriplinérvium,* Miq.). Large tree: lvs. chartaceous, ovate- or lanceolate-elliptic or oblong, 1–2 x ½in.: fls. in axillary pairs, very short-peduncled, dicœcious. Brazil.

URSÌNIA (John Ursinus, of Regensburg, 1608–1666; author of "Arboretum Biblicum"). *Compósitæ.* Here belongs the hardy annual known to the trade as *Sphenogyne speciosa.*

Annuals, perennials, or subshrubs: lvs. alternate, serrate, pinnatifid or usually pinnatisect: rays the same color on both sides or purplish brown beneath; involucre hemispherical or broadly campanulate: achenes often 10-ribbed.—A genus of about 60 species, all native to S. Afr. One species, *U. annua,* is also found in Abyssinia. In Flora Capensis, vol. 3 (1864–65), Sphenogyne and Ursinia are treated as separate genera, the distinctions being as follows: the achene is cylindrical in Sphenogyne, but obovate or pear-shaped in Ursinia, distinctly tapering to the base: the pappus is uniseriate in the former, biseriate in the latter, the inner series consisting of 5 slender white bristles. In the course of time these distinctions have been dropped and Sphenogyne included in Ursinia.

púlchra, N. E. Br. (*Sphenógyne speciòsa,* Knowles & Westc.). Fig. 3887. Annual, 1–2 ft. high, with lvs. bipinnately dissected into linear lobes and yellow or orange fl.-heads 2 in. across: rays about 22, 3-toothed, spotted purple-brown at base: st. glabrous, branched: lvs. alternate: scapes nearly leafless, about 5 times as long as lvs.: involucre 4-rowed; scales increasing in size from the base, outer rows with a brown scarious border, inner with a white scarious border. F.C. 2:77. P.M. 6:77. G.C. III. 4:356. Gn. 44, p. 217. R.H. 1843:445. G. 16:352. J.H. III. 54:85.—Both yellow and orange-colored fls. are sometimes found on the same plant. When well managed it blooms all summer. It is a native of the Cape region of S. Afr. It has been in cult. since 1836 but was not correctly described until 1887. It is much praised by connoisseurs, though it is not known to the general public. It seems to have enjoyed a longer continuous period of cult. than many other showy composites, in which the Cape is wonderfully rich.

Wilhelm Miller.

URTÌCA (classical name, alluding to the burning hairs). *Urticàceæ.* Nettle. About 30 annual and perennial erect simple or branching slender herbs, widely distributed, little if at all planted because of the stinging hairs and sts. and lvs.: fls. small, greenish and inconspicuous, racemose, spicate or clustered in the axils, monœcious or dicœcious, sometimes hermaphrodite; sterile fls. with 4 sepals and 4 stamens; fertile fls. with 2 pairs of sepals and a single erect ovary: lvs. simple, opposite, strongly nerved, dentate or crenate or incised. Several species of nettle are native in N. Amer. and a few are intro. weeds. The plants have very little ornamental value.

3887. Ursinia pulchra. (×¼)

URVÍLLEA (bears the name of Capt. Dumont D'Urville, French botanist and naval officer). *Sapindàceæ.* About a dozen species of climbing shrubs of Trop. Amer. Lvs. alternate, ternate, the lfts. entire or coarsely dentate and more or less pellucid-dotted: fls. whitish, on jointed pedicels, in axillary racemes, the peduncles ending in a pair of tendrils; sepals 5, the 2 outer ones smaller; petals 4; disk of 4 glands; stamens 8: fr. a 3-winged samara. Probably no species is in cult., the *U. ferruginea,* Lindl., of lists being *Serjania cuspidata.*

UTRICULÀRIA (Latin, *a little bag* or *skin,* referring to the bladders). *Lentibulariàceæ.* Bladderwort. As known to gardeners, the bladderworts are of two rather distinct groups,—the aquatic mostly native kinds sometimes used in pools and aquaria, and the tropical terrestrial kinds sometimes grown in warm-houses with orchids and other special plants. The whole group is of little importance horticulturally.

As commonly understood, Utricularia is a genus of some 200 aquatic and terrestrial herbs, of cosmopolitan distribution. Recently, however, the genus has been split into several genera, and the name Utricularia retained for certain aquatic species; with this taxonomic innovation, however, we are not concerned in this brief account. Under the older and prevailing definition,

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Utricularia comprises plants with numerous slender wiry scapes bearing one or many fls.: calyx large, 2-parted or 2-lobed; corolla with a spur which is usually long and curved under the fl.; posterior lip erect, entire, emarginate or 2-fid; anterior lip often large, broad, and showy, spreading or reflexed, entire, crenate or 3-lobed, or the middle lobe various: lvs. of the aquatic species much dissected, sometimes disappearing at flowering-time, very delicate: plant floating or rooting in the mud, the lvs., branches, and sometimes the roots bearing minute bladders; lvs. of terrestrial species linear or spatulate and rosulate at base of plant. The bladders trap small aquatic animals. These bladders have a valve-like door through which the animals enter when

3888. Utricularia longifolia. (×¼)

looking for food or when trying to escape from other creatures; they are most numerous and effective in the species which float in stagnant water. They are fewer in the marsh-inhabiting species. The terrestrial kinds often have minute deformed and useless bladders; these kinds are common in the tropics and are characterized by erect foliage of the ordinary type. These often form little tubers by which they may be propagated. The native aquatic species propagate themselves by seeds and also by winter buds. (A winter bud of another aquatic plant is figured under *Elodea*, p. 1110). Some of the utricularias are epiphytic in a way. Those who are familiar with bromeliaceous plants know how the water gathers in the axils of the lvs. These bromeliads are themselves often epiphytic, perching on high trees in moisture-laden tropical jungles. In the miniature ponds supplied by the lf.-axils of Vriesia and other bromeliads live certain utricularias with fully developed and effective bladders. Occasionally they send out a long "feeler" or runner-like shoot which finds another bromeliad and propagates another bladderwort.

The aquatic utricularias are sometimes cultivated in aquaria, but their flowers are not showy, nor are those of any of the hardy kinds. A number of them are native in lakes and ponds in the United States and Canada. The showy species are the terrestrial and epiphytic kinds of the tropics. These, for complexity of floral structure, beauty of color and lasting qualities, vie with certain orchids. In fact, they are usually grown by orchid-lovers in orchid-houses. Perhaps the most desirable of the genus are *U. montana*, *U. Endresii*, and *U. longifolia*, each of which represents a different color. Well-grown baskets of these plants have numerous scapes a foot or so high bearing five to twenty flowers, each 1½ to 2 inches across. In general, such plants are grown in warmhouses, *U. Endresii* requiring a stove temperature, while some of the others may thrive in an intermediate house. As a class they are grown in baskets, near the light, using a compost of fibrous peat and sand. The plants are kept constantly wet during the growing season and until the flowers are gone. During the winter they are rested, being kept in a cooler place and given just enough water to keep the tubers from shriveling.

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A. *Habit aquatic.*

B. *Foliage dissected into numerous thread-like segms.; lvs. floating.*

1. **vulgàris,** Linn. Hardy aquatic: sts. a few inches to 3 ft. long, with crowded 2–3 pinnately divided floating lvs. ½–1 in. long, provided with numerous bladders and yellow fls. ½in. long or more, borne in few-fld. racemes: scapes 6–8 in. high: corolla closed, with reflexed sides and a conical blunt spur. Eurasia, in ponds and channels. Gn. 28, p. 403.—Sometimes listed among aquatic plants. What is considered by some to be the same species occurs far northward in N. Amer.; represented in the U. S. by var. *americàna*, Gray, with a more slender and rather acute spur. Some authors consider the American plant to be distinct, and it then takes the name *U. macrorhìza*, LeConte, distinguished from the Eurasian material by longer sts., shape and direction of spur and reduced or rudimentary stolons. Sometimes collected for aquaria.

BB. *Foliage ribbon-like.*

2. **prehénsilis,** E. Mey. An aquatic plant with fl.-shoots twining above the water: lvs. (often disappeared at flowering-time) linear-lanceolate to lingulate, obtuse, sometimes nearly 1 in. long, narrowed into a slender petiole: bladders numerous on the lvs. and rhizoids, with the mouth near the stalk, nearly or quite globose, almost ½ line in diam.: fls. yellow, 1–6; upper lip of corolla broadly oblong-spatulate; palate erect, crested; spur straight and acute, descending, ¼in. or more long. Trop. Afr. G.C. III. 48:447.—A rapid grower and profuse bloomer in cult. Annual.

AA. *Habit terrestrial or epiphytic: foliage entire, erect.*

B. *Color of fls. white, with a yellow palate.*

3. **montàna,** Jacq. Tropical American epiphyte, with clusters of tubers ⅛–½in. long, minute, deformed, useless bladders and large white fls. with a yellow palate, the fls. 1–4 on a scape, each 1½ in. across: lvs. 4–6 in. long, elliptic-lanceolate. Trunks of trees, W. Indies and S. Amer. B.M. 5923. F.S. 19:1942. I.H. 18:64. G.C. III. 49:405. G. 29:251. G.W. 2, p. 414; 3, p. 518; 15, p. 301.—A lovely species.

BB. *Color of fls. yellow, with an orange palate.*

4. **bífida,** Linn. Terrestrial species from Trop. Asia, with minute bladders and small fls. resembling a diminutive linaria: lvs. densely matted, erect, thread-like, 1–2 in. long: fls. yellow, with an orange palate, ⅜in. long, 5–8 in a raceme: pedicels drooping in fr.: scape about 6 in. or less high. India, Malaya, China, Japan, Philippines. B.M. 6689.

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BBB. *Color of fls. purple, violet, or lilac, with a yellow palate.*

C. *Lvs. broader than long.*

D. *Shape of lvs. reniform.*

5. **jánthina,** Hook. f. Epiphytic Brazilian species growing in the lf.-axils of a bromeliad (Vriesia), with kidney-shaped lvs. and beautiful pale blue or lilac fls. 1½ in. across, ornamented by 2 vertical yellow lines on the palate edged with dark violet: lvs. with stalks 4–6 in. long and blades 2–4 in. across: scape about 6-fld.: upper lip hemispheric, arching; lower lip transversely oblong, entire. B.M. 7466.—Intro. by Sander, 1892. "Janthina" is the same as "ianthina," meaning violet-colored.

6. **renifórmis,** St. Hil. Brazilian species found in sphagnum bogs, having kidney-shaped lvs. and rose-colored fls. with 2 darker lines on the palate: upper lip truncate, emarginate; lower lip 3-lobed, the lateral lobes broad, the midlobe much shorter and scarcely produced. Brazil.—Once advertised in this country, but probably lost to cult. Very large for the genus, the lvs. ½–1 ft. long and scapes 1½–2 ft. high.

DD. *Shape of lvs. obcordate.*

7. **Húmboldtii,** Schomb. Guiana species, with long-stalked, cordate or obcordate, mostly solitary lvs. and dark purple-blue fls. 2½ in. across, with a triangular lower lip: scapes about 5-fld. F.S. 13:1390.—One of the showiest species. Cult. in England, perhaps not in Amer.

CC. *Lvs. long and narrow, linear, oblong or lanceolate.*

8. **Éndresii,** Reichb. f. Epiphytic Costa Rican species, with tubers about ¼in. long, solitary lvs. and pale lilac fls. 1¾–2 in. across, with a yellow palate: lvs. 1–3 in. long, narrowly elliptic-lanceolate: scape about 5-fld. B.M. 6656. J.H. III. 49:233. G.Z. 24, p. 217. Var. **màjor,** Hort., was once offered.—A deciduous species found at altitude of 2,000 feet.

9. **longifòlia,** Gardn. Fig. 3888. A Brazilian species, perennial and densely tufted: lvs. lorate or linear-lanceolate, narrowed into a petiole, to 12 in. long: scape slender, reaching 2 ft., with fls. 10 or less. *U. Forgetiàna,* Hort., intro. by Sander, is said to be a form of this species and the same as the plant figured in Gn. 52:142 (adapted in Fig. 3888) under the erroneous title of *U. latifolia.* It has beautiful violet-purple fls. nearly 2 in. across, with an orange palate. B.M. 8516. G.C. III. 13:713. The lvs. are singularly variable or plastic. Under favorable conditions, according to Prain, they may grow out into bladder-bearing stolons and may produce from their tips tufts of leaves and stolons and rhizoids. The species thrives under conditions suitable for nepenthes.

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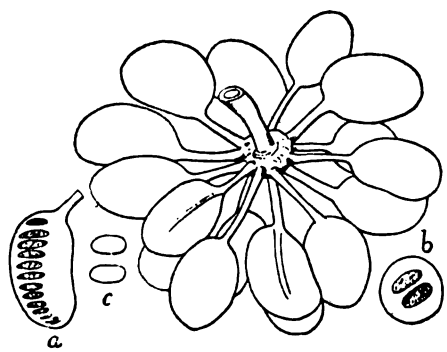
UVÀRIA (Latin, from *uva,* grape, on account of the grape-like clusters of the fruit). *Annonàceæ.* A group very closely allied to the American Asimina, but composed of Old World tropical plants, more or less clothed with stellate-pubescent hairs, and with a climbing or scrambling habit.

Flowers either solitary or in few-fld. clusters, either terminal or lf.-opposed; sepals 3, often combined into a cup-shaped calyx; petals 6, in 2 rows, one or both rows imbricate, or overlapping in the bud (not edge-to-edge as in Desmos), often connate at the base; stamens numerous, short, cuneate or nearly truncate, with parallel pollen-sacks on the back, very much as in Asimina, but with the connective either truncate or terminating in a lf.-like crest: gynæcium formed of a cluster of carpels projecting from the center of the mass of stamens, and developing into a cluster of pedicelled fleshy berries somewhat like those of Artabotrys or Canangium, but with the seeds usually numerous and arranged in 2 vertical rows, as in Asimina, or sometimes apparently 1-seriate. Few of this genus are in cult. For the principal Philippine species, see E. D. Merrill, in Philippine Journ. of Science, Section Botany, 10:228–30 (1915). The following species is the only one occurring about Manila.

rùfa, Blume (*U. purpùrea,* Blanco). SUSONG-CALABAO. CARBAO'S TEATS. Fig. 3889. A scandent shrub, often 16–20 ft. in length, the younger parts and lower surfaces of the lvs. rather densely and softly pubescent with radiating starlike clusters of short rusty hairs: lvs. oblong-ovate to oblong-lanceolate, 3–6 in. long, apex acuminate, base rounded or cordate, the petioles very short: fls. extra-axillary or lf.-opposed, solitary or 2 or 3 together in depauperate cymes: frs. a cluster of 18–28 pedicelled oblong velvety berries, red when mature; seeds many, in 2 rows, surrounded by whitish, aromatic, acidulous fleshy pulp.—According to P. J. Wester the fr. of this species together with that



3889. Uvaria rufa. *a,* longitudinal section of fruit; *b,* cross-section of fruit; *c,* seeds.

of an allied species having an orange-yellow, velvety skin and yellowish, granular, somewhat sweetish flesh is offered for sale in the markets of Manila. See The Philippine Agricultural Review 6:321, pl. 7, figs. *a* and *b* (1913) for further information.

W. E. SAFFORD.

UVULÀRIA (Latin, *uvula,* palate, referring to the hanging flowers). *Liliàceæ.* BELLWORT. "WILD OATS" in some parts. Graceful woodland hardy perennial herbs, useful in the wild border or in heavy shade; not showy, and little planted.

Stem erect and stout, from a creeping or horizontal short rootstock, naked or scaly at base, forking above: lvs. oblong, perfoliate, flat and membranaceous: fls. yellow, drooping, in spring, solitary on terminal peduncles; perianth narrowly campanulate, deciduous, segms. 6, spatulate-lanceolate, acuminate, obtusely gibbous at base, with a deep honey-bearing groove within bordered on each side by a callus-like ridge: caps. truncate, coriaceous, 3-lobed, loculicidal at summit.—About 4 species, N. Amer. Another species sometimes kept in this genus is treated under Oakesia.

Uvularias grow 1–1½ feet high, with a number of clustered slender stems which are forked and leaf-bearing mainly above. The foliage is of a delicate green, which with the terminal narrow bell-shaped drooping flowers make the plants elegant though not showy. The species are perfectly hardy and easy of cultivation in any light rich soil and a shady situation. They do well north of a wall in a well-prepared border and in such a position they far exceed the plants of the woods in luxuriance. Strong roots may be slowly forced for spring flowering. For distinction from Oakesia, see that genus, to which some of the plants commonly known as uvularias are referred.

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A. *Lvs. pubescent beneath.*

grandiflòra, Smith. Sts. 1–1½ ft. high, with 1 or 2 lvs. below the fork: lvs. oblong, oval or ovate, somewhat acuminate: fls. pale yellow, 1–1½ in. long; segms. usually smooth on both sides: stamens exceeding the styles: caps. obtusely 3-angled, truncate. May, June. Rich woods, Que. to Minn. south to Ga., Tenn., and Iowa. B.B. 1:409.

AA. *Lvs. not pubescent beneath.*

perfoliàta, Linn. Fig. 3890. Sts. more slender than in *U. grandiflora*, with 1–3 lvs. below the fork: lvs. oval-oblong or ovate: fls. pale yellow, about 1 in. long; segms. glandular papillose within; stamens shorter than the styles: caps. obtusely 3-angled, truncate. May, June. Rich woods, U. S.

U. sessilifòlia, Linn.=Oakesia sessilifolia.

F. W. BARCLAY.

3890. Bellwort.—Uvularia perfoliata. (×⅔)

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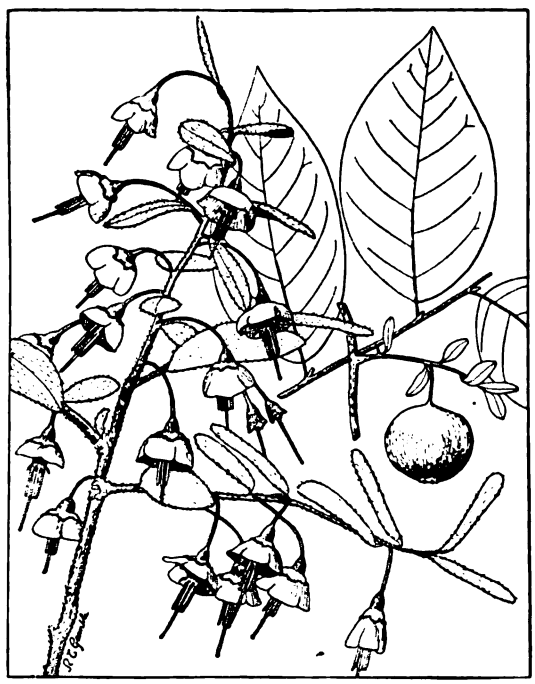
V

VACCÍNIUM (ancient Latin name of the blueberry). *Ericàceæ*. BLUEBERRIES, BILBERRIES, DEERBERRIES, and CRANBERRIES. Erect or creeping shrubs, often with green speckled twigs, well known in this country as the source of excellent wild berries; sometimes planted for ornament.

Leaves alternate, evergreen or deciduous, coriaceous or herbaceous: fls. solitary, axillary or terminal or in racemes; sepals 4–5 or obsolete; corolla gamopetalous, urceolate, cylindrical, campanulate, or rotate, 4–5-toothed or -parted, white or pink; stamens 8–10; anthers dehiscing by pores at the tips of long slender terminal tubes, epigynous: carpels 4–5; ovary inferior, 4–5-celled, or 8–10-celled by intrusion of the midrib of each carpel: fr. a many-seeded berry capped by the persistent calyx.—The genus consists of about 130 species of wide geographic distribution, extending from the Arctic Circle to the higher mountains of the tropics. They are most common in North America and the Himalayas. The genus is almost without representation in the southern hemisphere.



3891. Vaccinium stamineum. (×1)

The well-known confusion in the popular names applied to Vaccinium is stated by Munson as follows: "The terms 'bilberry' and 'whortleberry' usually mentioned as 'common names' by American writers are seldom or never heard among the common people in this country; while 'huckleberry' is often used indiscriminately for plants of this genus and for the Gaylussacias. In the central states the term 'huckleberry' is usually applied to *V. corymbosum*, while 'blueberry' is given to the low-growing species, like *V. canadensis* and *V. pennsylvanicum*. In New England, 'huckleberry' is reserved for species of Gaylussacia, while 'blueberry' is applied to the lower-growing species as above, and 'high-bush blueberry' to *V. corymbosum*. The red-berried species are, in general, referred to as 'cranberries.'"

Among the plants that lend tone to the landscape in October and November by reason of their bright foliage, many of the species of Vaccinium may be included—the brilliant red, crimson, and orange colors often persisting much longer than the bright-hued leaves of a large number of other plants. Of the ornamental species none is more strikingly beautiful late in the autumn than the common high-bush blueberry, *V. corymbosum*. When well grown it is a stout, thick, spreading bush 8 to 10 feet high. The plant is beautiful when in flower; the fruit is attractive and of the best quality, and the bright scarlet and crimson effects in late autumn, rivaling the sumach in brilliancy, are unsurpassed. As an ornamental plant the species deserves a place in every garden. *V. pennsylvanicum* also brightens waste places for a short time, but drops its foliage too early to be worthy of planting as an undershrub. The same is true of *V. canadense*, which is in many respects similar. *V. stamineum*, though early deciduous, is attractive when in bloom and throughout the summer by reason of its graceful habit. It is particularly adapted for sterile sandy or gravelly situations, and it is one of the very few ornamental shrubs specially suited for densely shaded situations. It has the peculiarity of never forming a true flower-bud, the blossom being open from the first. *V. arboreum* forms an irregular shrub too diffuse and straggling to be of value except when planted in masses at the South. *V. hirsutum* is as beautiful in its autumn coloring as is *V. corymbosum* and, like that species, retains its foliage late in the season. *V. Vitis-Idæa* and *V. uliginosum*, with their shining box-like foliage, can be used very effectively as edging for the shrubbery border. (W. M. Munson.)

For the most part, vacciniums are plants of peaty or sandy acid soil, and will not thrive in soils of a richer nature. Many species are very sensitive to the presence of lime, and they require special attention as to soil. See *Blueberry*.

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Quoted statements in the specific descriptions in the following treatment are from the original article on this genus by the late W. M. Munson in the "Cyclopedia of American Horticulture;" that article also gives an interesting account of the native production of the fruit.

KEY TO THE SECTIONS (No. 25 doubtful).

A. *Corolla campanulate to urceolate or cylindrical.*
B. *The corolla 5-lobed, open-campanulate; anthers awned on the back.* Section I. BATODENDRON
BB. *The corolla 4–5-toothed, urceolate, cylindrical, or campanulate-oblong.*

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cc. *Filaments glabrous: ovary 4–5-celled.*
d. *Anthers 2-awned on the back: lvs. deciduous.* Section III. EUVACCINIUM
dd. *Anthers awnless on the back: lvs. coriaceous, evergreen.* Section IV. VITIS-IDÆA
aa. *Corolla rotate or nearly so, 4-parted or divided, the narrow divisions revolute.* Section V. OXYCOCCUS

Section I. BATODENDRON. Corolla open-campanulate, 5-lobed; anthers tipped with long slender tubes, and 2-awned on the back: ovary and berry spuriously 10-celled, ripening in autumn, scarcely edible: lvs. deciduous, but of rather firm texture: fls. axillary and solitary or in leafy-bracted racemes, slender-pedicelled: bractlets minute or none.

A. *Fls. articulated with the pedicel; anthers included: berries black, many-seeded.* 1. **arboreum**
aa. *Fls. not so articulated; anthers much exserted: berry greenish, few-seeded.*
B. *Berries greenish or yellowish*..... 2. **stamineum**
bb. *Berries longer, plum-purple*..... 3. **melanocarpum**

1. **arbòreum,** Marsh. FARKLEBERRY. SPARKLEBERRY. Spreading shrub or small tree, 6–25 ft. high, with glabrous or somewhat pubescent branchlets: lvs. 1–2 in. long, evergreen in the S., somewhat coriaceous, smooth and shining above, paler and sometimes

3892. The high-bush blueberry.—Vaccinium corymbosum.
(Spray ×½)

pubescent beneath, obovate to oval, acute or obtuse, entire or obscurely denticulate: fls. profuse, axillary, and leafy-racemose, pendulous, articulated with the slender pedicel; corolla open-campanulate, 5-lobed, white; stamens included: berry small, globose, black, rather astringent, inedible. Sandy soil along river banks, Fla. and Texas to N. C. and Ill. L.B.C. 19:1885. B.M. 1607 (as *V. diffusum*). B.B. 2:580.—"It forms an irregular shrub too diffuse and straggling to be of use except in masses, for which purpose it is useful at the South."

2. **stamíneum,** Linn. DEERBERRY. SQUAW HUCKLEBERRY. Fig. 3891. A divergently branched shrub, 2–5 ft. high, with pubescent twigs, not white-speckled: lvs. 1–4 in. long, oval to obovate-oblong or elliptical, acute, entire, pale, glaucous and pubescent beneath: fls. very numerous in large leafy-bracted racemes, showy, jointed with the slender spreading or pendulous pedicels; calyx glabrous; corolla pure white, rarely purple-tinged, open-campanulate, 5-cleft, anthers and style exserted: fr. large, ⅜–½in. long, globose or pyriform, greenish or yellowish, glaucous, few-seeded, almost or quite inedible. Dry woods and thickets, E. N. Amer. R.H. 1907, p. 94.—Corolla peculiar in not being closed in the bud.

3. **melanocárpum,** Mohr. SOUTHERN GOOSEBERRY. Similar to the last but more white-pubescent: calyx white-tomentose: berries twice as large, shining black, with a juicy purple pulp, sweetish and slightly tart. Southern states.

Section II. CYANOCOCCUS. Corolla from cylindraceous to campanulate-oblong or ovoid, 5-toothed; filaments hairy; anthers included, awnless: ovary and berry completely or incompletely 10-celled by a spurious partition or projection from the back of each carpel; berry blue or black with a bloom, juicy, sweet, and edible, many-seeded: fls. white or rose-color, in fascicles or very short racemes, developed with or a little before the lvs. from large and separate scaly buds, short-pedicelled: scaly bractlets as well as bracts mostly caducous or deciduous.

A. *Lvs. thick, evergreen: bracts reddish, firm, tardily deciduous.*
B. *Sepals obtuse: teeth of lvs. glandular: berries black*..... 4. **nitidum**
bb. *Sepals acute: teeth of lvs. bristly: berries blue*..... 5. **Myrsinites**
aa. *Lvs. thinner, deciduous: bracts scaly, deciduous.*
B. *Corolla cylindrical, mostly over twice as long as broad.*
c. *The lvs. hairy beneath, serrulate*... 6. **virgatum**
cc. *The lvs. glabrous beneath, entire or nearly so*..... 7. **corymbosum**
bb. *Corolla urceolate or short-cylindrical, mostly less than twice as long as broad.*
c. *Ovary and berry glabrous.*
d. *Lvs. very pubescent at least beneath.*
e. *Plant tall*..... 8. **atrococcum**
ee. *Plant low*..... 9. **canadense**
dd. *Lvs. glabrous or nearly so except sometimes the midrib.*
e. *The lvs. elliptic, acute, green both sides, serrulate.*.....10. **pennsylvanicum**
ee. *The lvs. broader, less acute, dull above, glaucous beneath, nearly entire*.....11. **vacillans**
cc. *Ovary and berry glandular-hirsute.*12. **hirsutum**

4. **nítidum,** Andr. A diffusely much-branched shrub, ½–2 ft. high, with smooth or rarely pubescent branchlets: lvs. thick, coriaceous, shining, ¼–¾in. long, elliptic-oblong or obovate, acute or apiculate, serrulate, often with glandular teeth, nearly sessile, glabrous: racemes umbel-like: sepals and bracts rounded, obtuse; corolla small, ⅛–¼in. long, short-campanulate-cylindrical, 5-toothed, rose-color or whitish: berry small, black. Dry pine lands, Ga. to Fla.—Closely related to the next.

5. **Myrsinites,** Lam. Low evergreen nearly or quite glabrous shrub, erect or decumbent: lvs. firm, variable, spatulate to oblong-obovate, ¼–1 in. long, entire or serrulate, sometimes denticulate, mostly shining above, glabrate or puberulent beneath, strongly veiny: bracts and calyx-teeth acute or acutish; corolla cylindrical, ¼–⅜in. long: berries blue, globose. Sandy pine barrens, Va. to Fla. and La. B.M. 1550 (as *V. nitidum* var. *decumbens*).—The chief points of difference between this and the last species are the puberulent branchlets, prominently veined, bristly ciliate lvs., and acute calyx-teeth and bracts. "Grown as a pot-plant in coolhouses in England under the name of *V. Sprengerii*."

6. **virgàtum,** Ait. A shrub 2–12 ft. high, with slender green branchlets, the young twigs puberulent: lvs. ovate-oblong to cuneate-lanceolate, ¾–2 in. long, thinnish, acute, often mucronate, entire or minutely serrulate, green and glabrous above, pale or glaucous beneath; veins pubescent: fls. in short racemes, on naked twigs, appearing before the lvs.; corolla long and

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nearly cylindrical, ¼–⅜in. long, white or pink: bracts small, deciduous: berry black, almost or quite destitute of bloom. Swamps, S. Va. to Fla. and La. B.M. 3522. B.R. 302 (as *V. fuscatum*).—The distinction between this species and *V. corymbosum* is very slight. It is probable that, possibly excepting var. *tenellum*, this is only a southern form of *V. corymbosum* and should be reduced to varietal rank.

3893. Vaccinium pennsylvanicum.—Low blueberry. (×½)

Var. **tenéllum**, Gray (*V. tenéllum*, Ait.). A low form, mostly less than 2 ft. high, with smaller lvs. and nearly white fls. in short close clusters. S. Va. to Ark., Fla., and Ala.

7. **corymbòsum**, Linn. High-Bush Blueberry. Swamp Blueberry. Fig. 3892. A tall handsome bushy shrub, 4–12 ft. high, with yellowish green warty branchlets: lvs. large, 1½–3 in. long, ovate-oblong to elliptical, acutish, glabrous, half grown at flowering time: corolla long-cylindrical, ¼–½in. long, white: berries blue-black, of excellent flavor. Moist woods or bogs, N. E. N. Amer. Em. 2:454. Amer. Agric. 1886:364.—Exceedingly variable, and many forms unite the several varieties. Apparently many natural hybrids occur between this and other species, rendering the taxonomy very difficult. *V. corymbosum* is one of the most valuable species both for fr. and as an ornamental shrub. It thrives in peaty acid soil.

Var. **amœnum**, Gray (*V. amœnum*, Ait.?). A form with lvs. bristly ciliate or serrulate, bright green on both sides, shining above. "Mainly in the Middle Atlantic states." B.R. 400. B.M. 3433 (as *V. corymbosum*). Probably of hybrid origin.

Var. **pállidum**, Gray (*V. pállidum*, Ait. *V. albiflòrum*, Hook. *V. Constáblæi*, Gray). A pale and glaucous or glaucescent form with or without some pubescence: plant generally low, 2–4 ft. high: lvs. ciliate-serrulate. Common in mountainous regions southward. B.M. 3428.—Probably a distinct species.

Var. **fuscàtum**, Gray (*V. fuscàtum*, Ait.). A tall form with the mature entire lvs. fuscous-pubescent beneath: fls. virgate, somewhat spicate on the naked flowering twigs. In and about swamps, Ga. and Fla. to La. and Ark.

8. **atrocóccum**, Heller (*V. corymbòsum* var. *atrocóccum*, Gray). Downy Swamp Blueberry. A tall branching shrub similar to the last species: lvs. elliptic-oblong, acute, entire, dark green above, densely pubescent beneath, unexpanded at flowering-time: fls. in dense racemes; corolla shorter, greener, and often redder than in the last: berries said to be always black without bloom, smaller than in the last, of good flavor. Moist woods and bogs of E. N. Amer.—Apparently distinct from *V. corymbosum*, but seeming to hybridize with it.

9. **canadénse**, Kalm. Canada Blueberry. Low erect shrubs, 1–2 ft. high, much branched: the branchlets very downy: lvs. entire, dark green, ¾–1½ in. long, oblong-lanceolate or elliptical, acute, downy on both sides: corolla short-cylindraceous, greenish white, often tinged with red: berries medium or small, late, blue with much bloom. Low woods and bogs, New England, mountains of Pa., northward and northwestward. B.M. 3446.—"This species, commonly known as "velvet-leaf" or "sour-top" because of the character of its foliage and the somewhat acid fr., usually grows in rather boggy localities. The fr. is more acid than the other low forms and matures from 1–3 weeks later. It is not so popular in the market as the sweeter kinds, but it is very prolific and its lateness in ripening is in its favor."

10. **pennsylvánicum**, Lam. Low Blueberry. Fig. 3893. A dwarf shrub, 6–15 in. high: branchlets glabrous or hairy northward: lvs. membranous, oblong-lanceolate or elliptical, acute, distinctly serrulate with bristly pointed teeth, shining and green on both sides but often hairy on the midrib beneath: fls. on short pedicels; corolla short-cylindraceous, greenish white: berries large, bluish black with a bloom, sweet, the earliest to ripen in the North. E. N. Amer. B.M. 3434. Em. 2:456. Rep. Me. Exp. Sta. 1898:171. Var. **angustifòlium**, Gray. A dwarf form with more decidedly lanceolate lvs. Newfoundland, mountains of New England and northward. Var. **nigrum**, Wood (*V. nìgrum*, Brit.). Foliage very glaucous: berries black, without bloom. Usually found in colonies in the same situations as the typical form and occasionally the two are found intermingled. Rep. Me. Exp. Sta. 1898: 171. The fls. are said to appear earlier than those of *V. pennsylvanicum*.—"This species is extremely variable in size and shape of fr. and fls., but, with the exception of the varieties noted, the variations do not appear sufficiently constant to warrant making separations. In general the plant is of low, semi-prostrate habit, is extremely prolific, and thrives well on dry sandy hills. It furnishes the bulk of the blueberries found in the eastern markets. When mown down or burned, the new erect shoots produce, the following year, a long spike-like mass of bloom and fruit, which may be stripped off by the handfuls. Because of its character and early ripening habit, it is known on the blueberry plains as 'Early Sweet' or 'Low Sweet.'"

3894. Vaccinium hirsutum. (×½)

11. **vacíllans**, Kalm. Low Blueberry. Erect, glabrous, widely branched, ½–3 ft. high: lvs. 1–2 in. long, obovate or oval, scarcely acute, entire or sparingly serrulate, pale or dull glaucous on both sides: fls. in

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rather dense clusters generally on the leafless summits of twigs; calyx reddish; corolla short-cylindraceous, greenish white, often tinged with red: berries large, with much bloom, of excellent flavor, ripening late with *V. canadense*. Dry sandy or rocky places, N. E. N. Amer. Em. 1:454.—"One of the most common species of the northern and central states, particularly west of the Alleghanies. One of the two commonest upland dwarf blueberries."

12. **hirsûtum,** Buckl. HAIRY BLUEBERRY. BEAR BLUEBERRY. Fig. 3894. Low shrub, 1–2 ft. high: sts. green, grooved, obscurely 4-angled: branchlets hirsute with spreading white hairs: lvs. oblong-elliptic to ovate, acute or cuspidate, ¾–1¼ in. long, entire, deep green above, paler beneath, pubescent or hirsute on both faces, very short-petioled: racemes few-fld.: ovary, calyx, and corolla densely hirsute; sepals acute; corolla large, ovoid, campanulate, pale or reddish: berries purplish black, glandular-hirsute. Shaded mountain slopes, N. C. to Tenn. and Ga. G.F. 2:365 (adapted in Fig. 3894).—"This species, discovered about 1840, was lost sight of for half a century until rediscovered by Sargent, and transferred to the Arnold Arboretum. It is readily distinguished by the hairy fls. and fr. The fr. is described as fully as large as that of *Gaylussacia baccata*, shining black, and of an agreeable flavor. Under cult., it is not so densely hairy as in the wild state. It gives promise of being valuable under cult. as one of the latest of its kind to ripen. At the Arnold Arboretum the period of greatest fruitage is in the middle of Aug., berries remaining into Sept."

Section III. EUVACCINIUM. Corolla from ovate to globular and more or less urceolate, 4–5-toothed, rose-color or nearly white; filaments glabrous; anthers 2-awned on the back, included: ovary and berry 4–5-celled, with no false partitions: lvs. deciduous: fls. on drooping pedicels, solitary or 2–4 together, developing with or soon after the lvs.

A. *Fls. 2–4 in a fascicle, from separate scaly buds, 4-merous*.....13. **uliginosum**
AA. *Fls. solitary, axillary, usually 5-merous.*
B. *Branchlets not angled*.....14. **cespitosum**
BB. *Branchlets angled.*
C. *Shrubs low (1½ ft. or less)*.....15. **Myrtillus**
CC. *Shrubs tall (3–6 ft.).*
D. *Lvs. serrate: berries blackish, without bloom*.....16. **membranaceum**
DD. *Lvs. entire or nearly so.*
E. *Berry blue with bloom: lvs. 1–2 in. long*.....17. **ovalifolium**
EE. *Berry red: lvs. ¼–¾in. long*.18. **parvifolium**

13. **uliginôsum,** Linn. BOG BILBERRY. A low spreading much-branched shrub, ¼–1½ ft. high: lvs. thickish, obovate or oval, obtuse or retuse, ½–1 in. long, entire, nearly sessile, pale and glaucous on both sides, slightly pubescent beneath: fls. 2–4 together or sometimes solitary; calyx 4-parted, rarely 5-parted; corolla urn-shaped, 2–5-lobed, pink: berries bluish black with a bloom. Arctic and alpine N. Amer., Eu., and Asia. B.B. 2:576.—"The plant is useful for the shrubbery border in cold wet acid situations and its fr., though of poor quality, is used for food by the natives of the Northwest."

14. **cespitôsum,** Michx. DWARF BILBERRY. A dwarf tufted shrub, 3–12 in. high, nearly glabrous throughout: branches rounded: lvs. ¼–1½ in. long, obovate, cuneate-lanceolate or cuneate-spatulate, narrowed at base, obtuse or acutish, serrulate, smooth and shining: fls. solitary, on short axillary peduncles, nodding; corolla urceolate, small, slightly 5 (rarely 4) -toothed, pink or red: berries large, blue with bloom, sweet. Gravelly or rocky woods and shores, Maine, Vt., Wis., Col., Calif., and northward; also on alpine summits of New England and N. Y. B.M. 3429.—May be used in rock-gardens.

15. **Myrtillus,** Linn. WHORTLEBERRY. BILBERRY. Low glabrous shrub with sharply angled branches: lvs. ½–⅔in. long, ovate or oval, serrate, conspicuously reticulate-veined, glabrous, thin and shining: corolla globular ovate; calyx-limb almost entire: berries black, nodding. Mountainous regions, Eu., Asia, possibly N. Amer.—"Generally used as an article of diet and in making of drinks, particularly in the Old World. It is from this species that the common name whortleberry is derived. It is not of much economic importance in Amer." The red-fruited form of the Rocky Mts., and the N. W. has been separated as *V. scopàrium*, Leiberg, and is so recognized by Piper and by Coulter & Nelson. Its occurrence in the trade is doubtful.

16. **membranàceum,** Douglas (*V. myrtilloìdes*, Hook., not Michx.). An erect branching shrub, mostly glabrous throughout: the twigs slightly angled: lvs. 1–2 in. long, oval, oblong or ovate, acute or obtuse, finely serrate, membranous, reticulate-veined, green above, paler beneath, not shining: calyx-limb entire; corolla depressed-globose, yellowish green or purplish: berries large, oblate, black or purplish black, rather acid. Lake Superior, N. Wyo., westward and northwestward.

3895. Mountain cranberry.—Vaccinium Vitis-Idæa. (× about ½)

17. **ovalifôlium,** Smith. A slender straggling shrub, 3–12 ft. high, with slender, more or less angled branches: lvs. 1–2 in. long, oval to oblong, glabrous, thin, mostly rounded at both ends, entire or nearly so, pale green above, glaucous beneath: fls. solitary, on short recurved pedicels; calyx minutely 10-toothed; corolla ovoid or globose, urceolate: berries ½in. diam., large, bluish purple with bloom, acid but very good. Moist woods, Que. to Ore. and Alaska.—"This species is very abundant in the N. W., forming a large part of the undergrowth along the southern coast of Alaska. The berries, rather larger than peas, are collected in great quantities by the Indians, who use them fresh and dry them for winter. The exceptionally large berries and vigorous habit of this species suggest its value for cult., and particularly for crossing with the low-growing species."

18. **parvifôlium,** Smith. Shrub, 6–12 ft. high, straggling, with slender green sharply angled branches: lvs. ¼–¾in. long, oblong or oval, obtuse, entire, dull or pale: pedicels short, nodding in fr.: sepals 5; corolla globular, nearly white: berries bright red, acid, but fine for table use. N. Calif. to Alaska.—Not common in cult.

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Section IV. Vitis-Idæa. Corolla from ovate to globular and more or less urceolate, 4–5-toothed, rose-color or nearly white; filaments hairy; anthers awnless on the back: ovary and berry 4–5-celled, with no false partitions: lvs. coriaceous and persistent: fls. in short racemes or clusters from separate buds, bracteate and 2-bracteolate.

A. *Corolla 5-lobed; stamens 10.*
B. *Branchlets pubescent: plant erect*....19. **ovatum**
BB. *Branchlets glabrous: plant procumbent*....20. **crassifolium**
AA. *Corolla 4-toothed; stamens 8*....21. **Vitis-Idæa**

19. **ovàtum,** Pursh. An erect, rigid, evergreen shrub, 2–8 ft. high, with pubescent branchlets: lvs. ½–1 in. long, thick and firm, very numerous, shining, ovate to oblong-lanceolate, acute, minutely and acutely serrulate, glabrous or nearly so, bright green both sides: fls. in short and close axillary clusters; deciduous bracts usually red; corolla campanulate, ¼in. long, rose-color or nearly white; calyx-lobes acute, red: berries black, acid, with or without bloom. Moist woods, Vancouver to Monterey, Calif. B.R. 1354. J.F. 4:424.—"A distinctly western species, and one of California's most beautiful hedge-plants, but not well known. It is very tenacious of life and bears pruning well. It is prop. from suckers, cuttings, and seeds, which last it bears freely."

20. **crassifòlium,** Andr. Slender trailing shrub: sts. 2–3 ft. long: twigs pubescent: lvs. small, ¼–½ in. long, leathery and shining, oval to narrowly oblong or ovate or obovate, obtuse, sparsely serrulate or entire: fls. few, almost sessile, in small axillary clusters; corolla globose-campanulate, small (⅛in. long), rose-red, rarely whitish: berries black. Sandy moist pine lands, N. C. to Ga. B.M. 1152.—"Useful for the shrubbery border South."

21. **Vitis-Idæa,** Linn. (*Vitis-Idæa Vitis-Idæa*, Brit.). Mountain Cranberry. Cowberry. Partridge Berry in the N. Foxberry. Fig. 3895. Plants low, 6–10 in. long, creeping, glabrous: lvs. coriaceous, evergreen, obovate or oval, ¼–¾in. long, obtuse, dark green and shining above, with blackish bristly points beneath: fls. in short subterminal racemes; corolla bell-shaped, white or rose-colored, 4-cleft: berries dark red, acid. Arctic region, to the coast and mountains of New England, Minn., and Brit. Col. L.B.C. 7:616 (as var. *major*); 11:1023 (as var. *minor*).—"The frs., which are rather larger than currants, acid and somewhat bitter when uncooked, are largely used in the more northern regions for tarts, jellies, and preserves, or as a substitute for the common cranberry. According to Macoun, the fishermen's families along the Gaspé coast and the north shore of the Gulf of St. Lawrence gather the fr. of this species in large quantities for their own use and for sale, calling it 'low-bush cranberry.' Throughout the whole of N. Canada, hunters and trappers, as well as the native Indians, have frequently to depend upon it for food. It is valuable for the shrubbery border, where the strong contrast of the dark green foliage and the bright colored persistent fr. is very striking."

Section V. Oxycoccus. Corolla deeply 4-cleft or 4-parted; the lobes linear or lanceolate-oblong and reflexed; anthers exserted, awnless on the back, with very long terminal tubes: ovary and berry 4-celled, destitute of false partitions: fls. axillary and terminal, nodding, on long filiform pedicels, appearing in early summer: fr. maturing in autumn.

A. *Shrubs erect: lvs. deciduous, 1½–2 in. long*....22. **erythrocárpum**
AA. *Shrubs trailing: lvs. very small, evergreen.*
B. *Lvs. ovate, acute*....23. **Oxycoccus**
BB. *Lvs. oblong, obtuse*....24. **macrocarpon**

22. **erythrocárpum,** Michx. (*Oxycóccus erythrocárpus*, Pers.). An erect, divergently branching shrub, 1–4 ft. high: lvs. 1½–3 in. long, oblong-lanceolate to ovate, acuminate, finely bristly serrulate, thin, green both sides, paler beneath: pedicels solitary, axillary, shorter than the lvs., recurved, bractless: corolla flesh-color, ⅓in. long, 4-cleft, the lobes narrow, acute, revolute: berries globose, ¼in. diam., bright red turning darker, acid, scarcely edible. Higher Alleghanies, Va. to Ga. B.M. 7413.

23. **Oxycóccus,** Linn. (*Oxycóccus Oxycóccus*, McM.). Small Cranberry. Cranberry of the Old World. Slender creeping plants with short filiform sts., 4–10 in. long: lvs. ovate, acute, ¼in. long, with strongly revolute margins, coriaceous, evergreen, dark green and glossy above, white-glaucous beneath, glabrous: pedicels 1–4, terminal: filaments one-half length of anthers: berry red, ¼–⅓in. diam. Sphagnum swamps in subarctic and alpine regions of Old and New Worlds.—"Though smaller, its fr. is by many considered superior to that of the next."

24. **macrocárpon,** Ait. (*Oxycóccus macrocárpus*, Pers.). Larger American Cranberry. Sts. slender, creeping, elongated, 1–4 ft. long, somewhat coarser and stouter than in the last, the fl.-branches ascending: lvs. oblong or oval, obtuse or retuse, ⅓–½in. long, in texture and coloration similar to the last, margin less revolute: pedicels several, axillary and lateral: fls. larger; filaments shorter than in the last: berry red, larger, ½–1 in. long. N. N. Amer. B.M. 2586. Em. 2:456. See *Cranberry*.

Section VI (Position of this species doubtful)

Anthers muticous: branches red....25. **erythrinum**

25. **erythrinum,** Hook. An erect, glabrous, evergreen shrub, with bright red twigs: lvs. ovate, obtuse, coriaceous, entire: fls. in long, 1-sided, terminal racemes; corolla cylindraceous, 5-toothed, ½in. long, purple-red; anthers without terminal tubes. Mountains of Java. B.M. 4688. J.H. III. 34:39; III. 51:593. J.F. 4:364.—"Sent to England in 1852, and since grown by various nurserymen as a greenhouse plant. It is a strong plant, furnishing an abundance of bloom in Dec. and Jan. Not remarkable, but worthy of a place in collections. A very distinct type." The position of this species is doubtful. The absence of anther-tubes suggests that it may not belong to the genus Vaccinium.

K. M. Wiegand.

VAGÀRIA (derivation obscure). *Amaryllidàceæ*. Large tunicate bulbous herb, useful for autumn-flowering: lvs. strap-shaped, appearing rather late: fls. in many umbels, short-pedicelled, white; perianth narrowly funnel-shaped, tube slender, lobes narrow, erect-spreading; stamens affixed to the throat, slightly shorter than the perianth; ovary ovoid-globose, 3-celled: caps. membranaceous, somewhat valvately dehiscent.—One species, Syria.

parviflòra, Herb. Bulb globose, about 1½ in. through: fls. white. Offered by European bulb-growers for outdoor planting.

F. Tracy Hubbard.

VALERIAN: *Valeriana*. **Greek V.**: *Polemonium*. **Red V.**: *Centranthus*.

VALERIÀNA (Latin *valeo*, to be strong, in allusion to medicinal uses). *Valerianàceæ*. Valerian. Glabrous or rarely pubescent or villous perennial herbs, subshrubs, or shrubs, which are erect or scandent, most of them hardy and showy garden plants.

Roots strong-smelling: lvs., especially the radical ones, entire or dentate, or the cauline or all pinnatifid or once-, twice-, or thrice-pinnatisect: cymes sometimes dense, few-fld. and terminal, or clustered in dense or interrupted spikes, sometimes laxly corymbosely or variously panicled: fls. small, white or rose; calyx-limb

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before anthesis not conspicuous, after flowering divided into 5–15 plumose-ciliate setæ; corolla-tube attenuate at base, limb 5-cleft; stamens 3, rarely by abortion 1 or 2: fr. a compressed achene with the rear face 1-nerved, the front face 3-nerved.—About 265 species, mostly in the temperate and colder regions of the northern hemisphere but a few in the tropics and in the extra-tropical regions of the southern hemisphere.

The valerians in the American trade are hardy perennials of easiest culture. Only *V. officinalis* is well known. This is one of the characteristic plants of old gardens, being prized for the spicy fragrance of its numerous flowers in spring. It spreads rapidly from suckers arising from the roots, soon forming large colonies. The common species are often grown from seeds. *V. alba* and *V. rubra* of the trade are no doubt *Centranthus ruber*.

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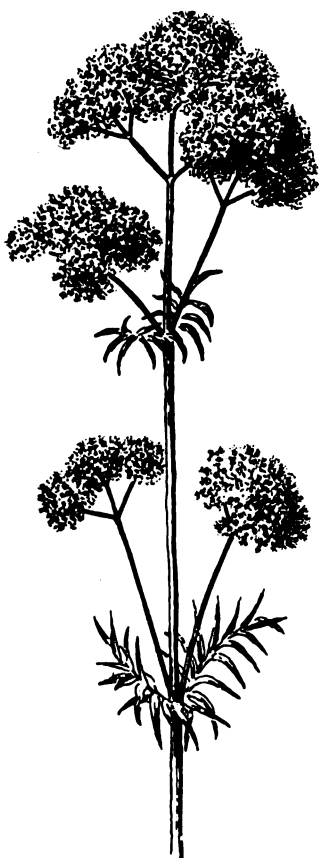
A. *Rootstock perpendicular, branching below.*

1. **edùlis,** Nutt. Perennial, 2–4 ft. high, glabrous or nearly so: rootstock perpendicular, fusiform, branching below: lvs. thickish, not serrate, slightly pubescent; radical oblanceolate to spatulate, entire or some sparingly laciniate-pinnatifid, tapering into a margined petiole; cauline rarely none, commonly 1–3 pairs, sessile and pinnately parted into 3–7 linear or lanceolate divisions, the terminal one spatulate: fls. polygamous-diœcious, yellowish white, in an elongated panicle. Ohio to Ariz. and Brit. Col. in wet or moist lands.—The roots are eaten by Indians.



3896. Garden heliotrope.—Valeriana officinalis. (×⅓)

2. **alliariifòlia,** Vahl. Perennial, glabrous, erect: rhizome thick and branched: st. tall, sulcate: radical and lower lvs. long-petioled, broadly cordate, coarsely toothed or repand; upper smaller, sessile or subsessile, cordate-triangular: corymb terminal, compound: fls. clustered, pink: fr. glabrous. E. Eu. and W. Asia.

AA. *Rootstock turnip-shaped.*

3. **ceratophýlla,** HBK. Perennial, glabrous, sparingly leafy, up to about 16 in. high: rootstock turnip-shaped: st. herbaceous, terete, striate: lvs. pinnatisect; segms. trifid-hastate, sessile; divisions linear, acuminate: corymb terminal, dichotomous: fls. snow-white: fr. pubescent. Mex.

AAA. *Rootstock horizontal or ascending, wit[h] fibrous roots.*

B. *St.-lvs. not compound or lobed, but sometin[es]*

4. **montàna,** Linn. Perennial, glabrous or [nearly] about 1 ft. high: rhizome slender, many-bra[nched] entire or dentate; those of the sterile young [shoots] the lowest ovate-rotundate or ovate, subcor[date] long-petioled; cauline lvs. triangular-oblon[g] acuminate; uppermost linear-lanceolate: cor[ymb] nal, compound or simple: fls. bright rose, di[œcious] and Caucasus. L.B.C. 4:317.

BB. *St.-lvs. (at least the lower ones) pin[natisect or] pinnately lobed.*

C. *Fls. diœcious or polygamous.*

5. **alpéstris,** Stev. (*V. alpina*, Adams). [Nearly] glabrous, about 6 in. high: rhizome horiz[ontal] slightly branched: radical and lower lvs. ovate-oblong, repand-dentate; intermediate lvs. acuminate, subsessile, unequally 2–3-parted or often undivided; uppermost linear, small: corymb terminal, clustered and head-like: fls. pink; ovary glabrous. Caucasus region.

6. **dioìca,** Linn. MARSH VALERIAN. Perennial, rather glabrous, about 1–2 ft. high: rhizome slender, stoloniferous, long-creeping: lower lvs. and those of the sterile shoots ovate-subcordate, elliptic or spatulate, entire, rather long-petioled; cauline lower lyrate-pinnate-parted; upper pinnatisect with linear segms. in 3–5 pairs: corymb terminal: fls. diœcious, pale rose-color, the sterile fls. larger. Moist soil. Eu.

CC. *Fls. hermaphrodite.*

D. *Radical lvs. (at least some of them) pinnatisect or pinnate.*

7. **officinàlis,** Linn. COMMON VALERIAN. GARDEN HELIOTROPE. CAT'S VALERIAN. ST. GEORGE'S HERB. Fig. 3896. Perennial, glabrous or more or less pubescent below, 2–5 ft. high: rhizome truncate, sometimes stoloniferous: sts. erect, simple below, somewhat branching above, sulcate: lvs. all pinnatisect; segms. 7–10-paired, usually dentate-serrate, those of the lower lvs. ovate-oblong, of the upper lvs. lanceolate, acuminate: corymb broadly paniculate, long-branched: fls. numerous, whitish, pinkish or lavender, very fragrant. Eu., N. Asia. G.W. 12, p. 472.—Variable. The medicinal valerian is obtained mostly from the roots of this species. Var. **álba,** Hort., is a white-fld. form. Var. **rùbra,** Hort., is a red-fld. form.

8. **excélsa,** Poir. (*V. sambucifòlia*, Mikan). Perennial, with long runners ending in rosettes: st. channelled, glabrous: lvs. pinnate; lfts. 3–5 pairs, coarse serrate or serrate-dentate, rarely entire, terminal lft. largest: infl. rather crowded: fls. reddish or white, rather larger than *V. officinalis*. Eu. Gn. 67, p. 3.

9. **sitchénsis,** Bong. Perennial, 1 ft. or less high: rootstock ascending, thick: radical lvs. ovate or oblong, simple or somewhat lobed; cauline lvs. short-petioled, 3–5-foliate, divisions or lfts. orbicular to oblong-ovate or in the upper ones ovate-lanceolate: fls. white, very fragrant, in contracted cymes; corolla funnelform, about ⅜in. long. Rocky Mts. to Alaska. G.F. 9:515.—A very early bloomer.

DD. *Radical lvs. entire or merely dentate.*

10. **arizónica,** Gray. Perennial, glabrous, 6 in. high: rhizome creeping, rather thick: sts. erect: lvs. succulent, basal ovate, entire or nearly so, 1 in. long, intermediate few, long-petioled, 2–4-lobed; cauline subsessile, 3–5-parted: cyme glomerate-congested: fls. whitish or pinkish; corolla ½in. long, tubular broadened gradually. Ariz. G.C. III. 29:198. G.W. 12, p. 102.

11. **Phù,** Linn. Perennial, glabrous or pilose, not so tall as *V. officinalis:* rhizome inclined, simple, fusiform: st. stout, tall, simple or slightly and shortly branched: radical lvs. ovate-oblong, long-petioled, entire or at base

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incised-lobed; cauline pinnately parted into 3–4 pairs of oblong, acute, entire, decurrent segms.: corymb trichotomous: fls. whitish to somewhat flesh-colored. Caucasus region. Var. **aùrea,** Hort., has young shoots golden yellow.

12. **pyrenàica,** Linn. Perennial, 2–4 ft. high, pubescent: rhizome large; stolons none: st. erect, sulcate: lvs. glabrous, radical large, long-petioled, cordate, coarsely and unequally toothed; cauline auriculate,

3897. Valerianella olitoria.—Corn salad.

3-cut, segms. dentate, terminal larger and ovate-cordate, lateral 2 (rarely 4 or 0) obliquely elliptic: cyme large, corymbose: fls. pale rose: fr. glabrous, linear-oblong. Pyrenees.

V. álba, Mass., is Centranthus ruber var. albus.—*V. coccínea,* Hort., is offered (Centranthus?).—*V. coccínea álba,* Hort., is offered in the trade.—*V. Cornucòpiæ,* Linn., is Fedia Cornucopiæ.—*V. macrosíphon,* Vilm., is Centranthus macrosiphon.—*V. rósea,* Hort., is offered in the trade.—*V. rùbra,* Linn., is Centranthus ruber.

F. Tracy Hubbard.†

VALERIANÉLLA (diminutive of Valeriana). *Valerianàceæ.* Annual dichotomously branched herbs, chiefly spring plants, sometimes planted in wild-garden or rock-garden; one is a salad plant.

Leaves, lower, in a radical rosette, entire; cauline entire, dentate or rarely incise-pinnatifid: cymes sometimes corymbosely paniculate fastigiate, sometimes densely globose at the ends of the branches: fls. whitish, pale bluish, or rose; corolla-tube short or rarely elongate, limb 5-cleft, spreading; stamens 3: fr. 3-celled, 2 of which are empty.—About 58 species, Eu., N. Afr., W. Asia, and N. Amer., mostly in the Medit. region.

Corn salad is both a salad plant and a pot-herb, chiefly the former. The name "corn salad" is probably derived from the fact that the plant grows spontaneously in the grain-fields of Europe, large quantities of it being gathered in early spring. It is rather tasteless compared with lettuce, and is little known in America. Abroad it is prized as a fall and winter salad. It is a cool-season crop, grown like lettuce and matures in six to eight weeks. Plants should stand about 6 inches apart in the row. An ounce of seed should give 2,000 to 3,000 plants. The following description of the varieties is derived from Vilmorin's "Vegetable Garden." See Vol. II, p. 851.

olitòria, Moench. Corn Salad. Lamb's Lettuce. Fetticus. Fig. 3897. An "autumnal annual" herb, the seed of which ripens in April or May, soon falls to the ground, and germinates in Aug. The plant makes its growth in the fall and flowers the following spring. In cult. the seed is generally sown in early spring or late summer. The plant forms a dense rosette of spoon-shaped lvs. which grow in a decussate fashion, and has an angular forking st. bearing small bluish white fls. in terminal clusters. Eu., Orient.—The Round-leaved variety has much shorter lvs. than the common type and they are half-erect instead of spreading, and less prominently veined. This kind is the one grown almost exclusively for the Paris market. The Large-seeded variety is more robust than the common type and the seed is nearly twice as large; lvs. marked with numerous secondary veins. Much grown in Holland and Germany. The Etampes variety has very dark-colored lvs., which are often undulate or folded back at the margins; lvs. narrow, prominently veined, thicker and more fleshy than the other kinds and specially suited to cold weather and long-distance shipment. The cabbaging variety differs from the others in forming a heart or head of fine flavor. Unfortunately it is the least productive type, but it bears shipment well if properly grown.

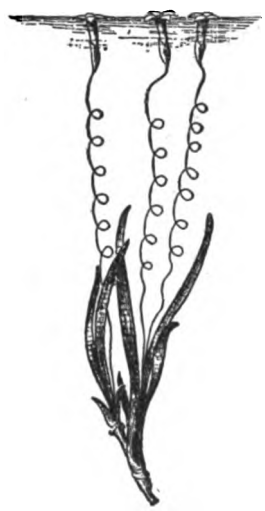
eriocárpa, Desv. Italian Corn Salad. Distinguished from the common species by the lighter color of the lvs., which are slightly hairy and somewhat toothed on the edges toward the base. The plant is native to the south of Eu., where it is highly esteemed because it does not run to seed so quickly in a warm climate. It is undesirable for northern climates.

Wilhelm Miller.

VALLÀRIS (perhaps from the latin *vallo,* to inclose; the plants are said to be used in Java for fences). *Apocynàceæ.* Twining shrubs, suitable only for the warmhouse in the N., but hardy outdoors in the extreme S. where used as an ornamental. Lvs. opposite, minutely dotted: fls. white, in axillary, subaxillary, or superaxillary dichotomous cymes; calyx 5-parted, glandular or not within, segms. narrow; corolla salver-shaped, lobes broad, overlapping to the right; disk various; carpels 2, at first connate, many-ovuled.—About 5 or 6 species, Trop. Asia and Malaya.

Hèynei, Spreng. (*V. dichótoma,* Wall.). Tall climbing shrub; bark pale: lvs. elliptic, oblong or linear-oblong, 1½–4 x ¾–1½ in., glabrous or pubescent, acuminate: cymes pubescent, 3–10-fld., sessile or peduncled, dichotomous: fls. pure white, ⅔in. across, fragrant; sepals ovate-oblong, obtuse; disk ciliate: follicles 6 x 2 in., straight, tapering from a rounded base to a stiff point. Himalaya to Burma and Ceylon. —Intro. into Fla.

VALLISNÈRIA (Antonio Vallisneri, 1661–1730, Italian naturalist). *Hydrocharitàceæ.* Two species of aquatic plants, including the well-known eel-grass or tape-grass. This plant is found in fresh water around the world. It is a submerged plant with linear lvs. ½–6 ft. long, depending on the depth of the water. The lvs. originate in a tuft at the bottom of the water, and the plant spreads by runners sent out from these tufts. Eel-grass is usually found in quiet waters. It has no horticultural rank, except as an aquarium plant. Like many other aquarium plants, it has special interest for students of botany. The pistillate fls. are borne on very long spiral threads and come to the surface, as shown in Fig. 3898. The staminate fls. are borne on very short stalks near the bottom of the water. At the proper time the staminate fls. break away from their stalks and rise to the surface of the water. As they float about, some of the pollen is conveyed to the pistillate fls., and in this haphazard way the blossoms are fertilized and seed is produced.



3898. Eel-grass.—Vallisneria spiralis. (Reduced)

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Both kinds of fls. are very small, and they are borne on separate plants. Eel-grass is readily collected, or can be procured from dealers in aquarium supplies or from collectors of native plants. The plant is sometimes called "wild celery," because it is said to impart a celery-like flavor to wild ducks that feed on it.

spirâlis, Linn. EEL-GRASS. TAPE-GRASS. Fig. 3898. Hardy submerged aquatic plant: lvs. thin, linear, 5-nerved, sometimes serrate near the apex: fls. white. Aug., Sept. N. S. to Fla. and westward; Eurasia; Austral. R.B. 20, p. 194. V. 4:157.

WM. TRICKER.
WILHELM MILLER.

VALLÒTA (named for Pierre Vallot, French botanist). *Amaryllidàceæ.* SCARBOROUGH LILY. Greenhouse tunicate bulb: scape robust, hollow: fls. large, in many umbels, sessile or shortly pedicelled; perianth funnel-shaped, straight, erect, tube short, throat large, lobes oblong-ovate; stamens affixed at the base of the lobes and shorter than them; ovary 3-celled: caps. oblong-ovate, dehiscent from the base.—One species, S. Afr. It has been proposed that Vallota be considered a subgenus of Cyrtanthus. The latter is a group of about 20 species of plants with fls. of various colors and naked at the throat. Cyrtanthus proper and the subgenus Monella have beautiful pendulous fls. in umbels, but the plants are not so easy to grow as Vallota. It has been suggested that they be crossed with the more robust Vallota in the hope of combining their varied colors and pendulous grace with the strong constitution of the Vallota. Such a process would be similar to the one by which the noble race of Hippeastrum hybrids has been given to the world. Vallota is undoubtedly related to Cyrtanthus through the subgenus Gastronema, which has erect fls. and differs chiefly in the stamens. Of this subgenus *C. sanguineus* is in the trade (p. 945). The best form of Vallota seems to be the variety *magnifica.*

The Scarborough lily is generally rated as a greenhouse bulb, but it can be grown by the amateur who has no glass, provided the plant can be kept over winter in a well-lighted cellar. Many persons have had no success with vallota. Such failures are generally due to the plants being kept too dry during winter. Although Baker says the leaves die down at the Cape in autumn, the plant acts like an evergreen in cultivation. Unlike most bulbous plants, the vallota should never be dried off but kept moderately moist about the roots throughout the year. The vallota is also strongly opposed to interference with its roots. It is possible to preserve a flowering specimen in most luxuriant health for three or four years without repotting, simply by applying liquid manure to the roots occasionally during the summer. The culture of vallota is not difficult when its peculiarities are understood. Several years are needed to work up a good plant to the specimen size. A vallota bulb is about twice as large as a hyacinth. For the first potting use a light soil, with a little sand at the base of the bulb, and place the bulb a distance below the surface equal to its own diameter. Use as small a pot as possible at every stage; shift only when the soil is well filled with roots and be careful to break no roots when shifting to a larger pot. The final potting is an important operation, as the plant is not to be disturbed again for three or four years. Drainage should be ample and perfect. It is essential that the potting soil be of a strong permanent nature and rich in plant-food. A good compost consists of turfy loam, fibrous peat and old cow-manure in equal parts. Add a little sand and charcoal. Avoid repotting until it is strictly necessary, and do so only when it is required to increase the number of plants or when there is danger of the roots breaking the pot. For amateurs the best time to repot the plants is directly after the flowering period. Use the greatest care in handling the roots. Allow the bulbs to project a little beyond the surface. Some gardeners prefer to repot vallota in June or July when root-action has started, but before the flower-stems have pushed up. Vallota likes full sunshine at all times of the year. The plant will stand a few degrees of frost in winter. Beware of over-potting; it is better to have the bulbs crowd one another out of the pot. Amateurs sometimes raise vallotas in the window-garden, one bulb in a 6-inch pot with one or two flower-stalks, but a large specimen is well worth years of care. The Scarborough lily has been cultivated by rich and poor for over a century. Its popular name is supposed to have been derived in same way as the Guernsey lily,—a Dutch bark having been wrecked off the coast of England, some bulbs washed ashore and became established as garden plants. Vallota is considerably grown for the London market, and it is said that some growers succeed in blooming their plants twice the same year, in winter and summer. At the Cape, the species is said to be native to peat-bogs, which fact would account for the special winter treatment which it needs. In California the plant blooms at various times of the year. (Michael Barker.)

purpùrea, Herb. SCARBOROUGH LILY. Fig. 3899. Bulb large: lvs. appearing with the fls., strap-shaped, 1½–2 ft. long, dying down in autumn: peduncle hollow, slightly 2-edged, 2–3 ft. long: fls. scarlet. G. 1:36; 3:479; 9:331; 10:77; 37:89. Gn. 30, p. 245; 42, p. 273; 59, p. 44; 68, p. 385; 71, p. 544. G.Z. 15:32. J.H. III. 45:453. R. H. 1870:50 (as *V. grandiflora*). A. F. 9:211. Gng. 2:361. A. G. 14:81.—The typical form has the scapes about 1½ ft. high and blood-red fls. 2½ in. across. Var. **álba,** Hort., is a white-fld. form. G.C. III. 36:150. Var. **màjor,** Hort., is 3 ft. high and has fls. over 3 in. across. B.M. 1430 (as *Amaryllis purpurea*). Var. **minor,** Hort., is smaller than the type in all parts. B.R. 552 (as *Amaryllis purpurea* var. *minor*). Var. **exímia,** Bull., has fls. 4 in. across, with whitish, feather-like blotches on the base of the perianth-segms. Var. **magnífica,** Hort., is probably the best and most robust form: fls. 5 in. across, with a white eye. Colors said to be brighter and more uniform than in any other kind. Gn. 30:244. G.C. III. 3:240.—*V. purpurea* is a S. African representative of the American genus Hippeastrum, popularly known as "amaryllis." It is a bulbous plant with large red funnel-shaped 6-lobed fls., blooming in Sept. and later. A pair of well-grown specimens in large pots or tubs make a showy ornament for the porch. Plants have been grown with over 50 fl.-trusses, each truss bearing an umbel of 4–9 fls., the individual fls. being 3–4 in. or more across. Vallota is a monotypic genus and is distinguished from Hippeastrum by the seeds being winged at the base. The tube of the fl. is longer than in the typical Hippeastrums and at the base of each perianth-segm. is a cushion-shaped callus somewhat different from the minute scales or distinct neck that is often found at the

3899. Scarborough lily.—Vallota purpurea. (From a specimen 2 feet high.)

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throat of a Hippeastrum. The plant deserves to be better known among amateurs and cottagers.

hýbrida, Hort. Bull., is a hybrid between *Vallota purpurea* and *Cyrtanthus sanguineus*, which is intermediate in character between the two parents, both in foliage and fls., the latter being borne in umbels and a uniform bright orange-vermilion in color.

WILHELM MILLER.
F. TRACY HUBBARD.†

VANCOUVÈRIA (after Capt. George Vancouver, commander of the Discovery in the voyage to the northwest coast in 1791–1795). *Berberidàceæ*. Low hardy perennial herbs, grown in the garden border.

Rhizome creeping: lvs. pinnate, 2–3-ternately compound: scape leafless, racemose or somewhat paniculate at the summit: sepals 6, in 2 rows, obovate, petallike, reflexed; petals 6, ligulate; stamens 6: fr. a follicle, dehiscent by a dorsal suture.—Three species, natives of the Pacific coast of N. Amer. The lvs. are somewhat like maidenhair or rue, and the fls. are rather small and white or yellow. Vancouverias demand a rich soil in rather shady positions. They are not showy plants, but have foliage of an elegant and refined type.

hexándra, Morr. & Decne. About 1 ft. high: rootstock woody, slender: lfts. roundish, mostly angulately 3-lobed and cordate: scape naked or 1-lvd.: panicle simple or loose-branched: fls. white or cream-colored. May, June. Coniferous woods, Brit. Col. to N. Calif. near the coast. Gn. 30, p. 263.

chrysántha, Greene (*V. hexándra* var. *aùrea*, Rattan). About 1 ft. high: lfts. evergreen, rather 3-lobed, usually whitened and pubescent beneath: infl. subracemose: fls. somewhat larger than in *V. hexandra*. Ore.

parviflòra, Greene. INSIDE-OUT FLOWER. From 8–20 in. high: lvs. glabrous or with rusty hairs, persisting through winter; lfts. thickish, roundish in outline, broadly cordate at base, obscurely or evidently 3-lobed with a notch at summit of each lobe: panicle bearing 25–55 white or lavender-tinged fls. Coniferous woods, Calif.

F. TRACY HUBBARD.†

VÁNDA (native name in India). *Orchidàceæ*. One of the most attractive groups of East Indian orchids, nearly all species having large handsome flowers.

Dwarf and short-stemmed or tall and branched, sometimes climbing to a considerable height; erect species forming compact plants, with sts. and branches well clothed with 2 opposite rows of lvs.; species like *V. teres* with a loose straggling habit: lvs. flat or channeled and keeled or terete, sometimes fleshy and deeply channeled; apex pointed, lobed or toothed: fls. in racemes from the axils of the lvs.; sepals and petals similar, spreading, narrowed at the base almost to a claw; labellum firmly united to the column, spurred, lateral lobes small, erect, middle lobe spreading; pollinia on a common stipe.—About 25 species, natives of India and the Malay Isls., with outlying species in China and New Guinea.

Notwithstanding the various conditions surrounding the different species of vanda in their natural habitats, the plants may nearly all be cultivated successfully under the same general treatment. When a general collection is grown, a house of east and west exposure will be found best suited to the wants of vandas. The plants require plenty of light and do not need any shade from November until the middle of February. A house of east and west aspect will require less shading during late fall and early spring than one of southern exposure, and there will be fewer ill effects from direct solar heat at all times. From February until November shading will be necessary, but it should never be too heavy or black-spot is likely to appear. The winter temperature should range from 60° to 65° F. by night and 70° to 75° by day, with a gradual increase of 10° during the summer months. A few degrees more with solar heat and ventilation will do no harm. The atmosphere must be kept moist by damping the benches and paths freely once or twice a day, and ventilation should be given whenever possible, in greater or less degree according to outside conditions. Especially during wet cheerless weather is ventilation important, even if fire heat has to be applied to retain the desired temperature. Vandas may be grown well in either pots or baskets, but the latter are preferable, as they admit air more freely to the roots, whereby they are not so liable to decay from overwatering during severe weather. The best potting or basketing material consists of chopped live sphagnum moss freely interspersed with large pieces of charcoal. This material should be pressed in rather firmly about the roots, leaving a convex surface when finished. A plentiful supply of water is essential at all seasons with copious syringing over the foliage in bright weather. The compost should never be allowed to remain dry for a long time. *V. tricolor* and similar species grow very well among foliage plants in the warmhouse, where their large aërial roots, which are freely emitted from the sides of the stems, may ramble among the foliage and thereby retain moisture a long time after syringing. A few species, such as *V. Amesiana*, *V. cærulea*, and *V. Kimballiana*, with one or two other alpine species, require about 10° cooler temperature, but otherwise similar treatment to other species of the genus. Stock is increased by removing a foot or more of the leading growth with a sharp knife, allowing several roots to remain attached to each growth and basketing them in the usual manner. These new pieces should be frequently syringed overhead until they become established or they are likely to shrivel. The old stems will nearly always send out several new growths. The principal insect enemies of vandas are several species of scale, which breed fast in a dry atmosphere. They can be kept in check by syringing with strong tobacco-water and by sponging the plants with a 20 per cent solution of alcohol. (Robt. M. Grey.)

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KEY TO THE SPECIES.

A. *Labellum spurred.*
B. *Lvs. flat, or channeled and keeled, toothed or lobed at the apex.*
C. *Racemes loose: labellum with lateral lobes.*
D. *Fls. 1–1½ in. across.*
E. *Color blue* ..... 1. cærulescens
EE. *Color yellow* ..... 2. parviflora
3. spathulata
EEE. *Color white or pale yellow, but streaked and shaded with brown* ..... 4. lamellata
5. Boxallii
DD. *Fls. 2 in. or more across (sometimes less in Nos. 8 and 11).*
E. *Color blue* ..... 6. cærulea
EE. *Color white* ..... 7. Denisoniana
EEE. *Color white or yellowish, but spotted with purple or brown.*
F. *Middle lobe of the labellum dilated, reniform* ..... 8. Bensonii
9. insignis

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FF. *Middle lobe slightly dilated, truncate or emarginate.*
G. *Apex emarginate or 2-lobed*.....10. **tricolor**
11. **Roxburghii**
GG. *Apex truncate and obscurely mucronate*....12. **limbata**
FFF. *Middle lobe shorter than the sepals, flabelliform*...13. **Parishii**
CC. *Raceme dense, cylindrical: labellum without lateral lobes*.....14. **densiflora**
BB. *Lvs. semi-terete and deeply channeled, pointed*.....15. **Amesiana**
16. **Kimballiana**
BBB. *Lvs. terete*.....17. **teres**
18. **Hookeriana**
AA. *Labellum not spurred*.....19. **Cathcartii**
20. **Sanderiana**

1. **cæruléscens,** Griff. St. 1–2 ft. high: lvs. 5–7 in. long, deeply channeled, truncate and 2-lobed at the apex: racemes many, slender and pendulous, each bearing about 12 fls.: fls. 1 in. across; sepals and petals obovate, subacute, undulate or twisted, pale lilac-blue; labellum shorter than the sepals, middle lobe cuneate-obovate, with a delicate 2-lobed tip, violet with fleshy dark blue ridges, side lobes small, dark blue. Spring. Burma. B.M. 5834. F.M. 1877:256. G.C. 1870:529. C.O. 13.—Color varies from blue to nearly white. Var. **Bóxallii,** Reichb. f. Fls. pale violet or nearly white; disk of the labellum deep violet with white lines on the sides. B.M. 6328. C.O. 13*a*. Var. **Hennisiàna,** Schlecht. Fls. similar in color to *V. cærulea*, with dark blue lip, and slender spur about ½in. long. Var. **Regnièri,** André. Fls. deeper colored. R.H. 1900:634.

2. **parviflòra,** Lindl. St. 4–6 in. high: lvs. strap-shaped, 4–8 in. long, unequally obtusely 2-lobed: racemes erect, many-fld.: fls. small, yellow; sepals and petals obovate-spatulate; labellum shorter than the sepals, middle lobe obovate, dilated, truncate and 2-lobed at the apex, yellow below, white above, spotted and dashed with purple and having thick fleshy ridges. Himalayas. B.M. 5138 (as *Aërides Wightianum*).

3. **spathulàta,** Spreng. St. 2 ft. high: lvs. 2–4 in. long, obtusely 2-lobed: peduncle robust, 12–18 in. tall, few-fld.: fls. 1¼ in. across, golden yellow; sepals and petals oblong-spatulate, flat; labellum as long as the sepals, clawed, side lobes very small, broadly obovate, middle lobe suborbicular, obscurely 3-fid. Ceylon, India.

4. **lamellàta,** Lindl. Lvs. channeled, leathery, obliquely and acutely bifid at the apex: fls. pale yellow, stained with red; sepals and petals obovate, obtuse, undulate, the lower sepal larger and somewhat incurved; middle lobe of the labellum obcuneate, retuse, auriculate, having a pair of red elevated plates and 2 red tubercles just below the apex. Aug.–Nov. Philippines.

3900. Vanda cærulea. (×⅓)

5. **Bóxallii,** Reichb. f. (*V. lamellàta* var. *Bóxallii*, Reichb. f.). St. tall, with long recurved lvs.: raceme longer than the lvs., bearing 14–20 fls.: sepals white, with the lower margins of the lateral pair sepia-brown; petals white, with violet streaks which are also found on the sepals, pandurate with large lamellæ and square auricles, mostly lilac. Nov., Dec. Philippines. G.C. II. 15:87. Gn. 19:574. C.O. 9.

6. **cærùlea,** Griff. Fig. 3900. St. 1–2 ft. high: lvs. rigid, linear, 6–10 in. long, obliquely truncate and toothed at the tip: raceme 1–2 ft. long: fls. 3–4 in. across, pale blue; lateral sepal obovate; petals broadly obovate, clawed; labellum less than one-third the length of the sepals, dark blue, linear-oblong, side lobes small, rounded, middle lobe with 2 thickened ridges. Late autumn. India. F.S. 6:609. I.H. 7:246. Gn. 21:254; 31, p. 566; 47, p. 145; 50, pp. 59, 418; 52, p. 410. R.B. 17:265. G.C. III. 3:41; 7:17; 11:272; 44:374; 45:264. Gng. 3:135; 15:132. G.F. 3:77. A.F. 6:685; 25:1092; 27:1136. Gn.W. 11:377. J.F. 1:102. C.O. 5. G. 18:66. F.R. 1:371. R.H. 1881:290 (as var. *grandiflora*).—This is considered to be one of the best species in cult. The fls. are often tessellated. Var. **álbens,** Hort. Sepals and petals pure white, with slight tinge of reddish purple at tips. Var. **albídula,** Hort. Fls. white with blue veining on lip. Var. **blenheiménsis,** Hort. Fls. closely veined with pure blue on white ground. Var. **Chárlesworthii,** Hort. Fls. entirely pure white except a little yellow on base of lip. G.M. 51:831. O.R. 1908:361. Var. **Peetersiàna,** Cogn. Sepals and petals very pale rose-lilac, lip rose. C.O. 5*a*. Var. **Rógersii,** Hort. "A distinct, nearly white variety, with fls. of moderate size and an unusually long spur." Var. **Sánderæ,** Hort. Tips and margins of sepals tinged with magenta-pink, the petals flushed with same color; lip deep magenta. G.C. III. 48:415. Var. **Wríglei,** Hort. Fls. smaller than type; sepals and petals pure white; lip rose-pink.

7. **Denisoniàna,** Benson & Reichb. f. St. short: lvs. linear, 6–10 in. long, recurved, deeply notched at the apex: peduncles short, stout, bearing 4–6-fld. racemes: fls. white, 2 in. across; sepals and petals waved and twisted, the lateral sepals broadly obovate, falcate; petals clawed, spatulate; labellum longer than the sepals; side lobes large, subquadrate; middle lobe panduriform, with 2 orbicular, diverging, terminal lobes. Summer. Burma. B.M. 5811. I.H. 19:105. F. 1869, p. 250. G.C. II. 24:105. A.F. 6:607. C.O. 8.

8. **Bénsonii,** Batem. St. about 1 ft. high, very leafy: lvs. linear, leathery, 6–8 in. long, obliquely toothed at the apex: fls. 2 in. across, 10–15 in a raceme, 1–1½ ft. long; sepals and petals obovate, obtuse, clawed, white outside, yellowish green with numerous brown dots inside; labellum violet, with white spur and side lobes, middle lobe terminating in a reniform, bifid apex. Summer. Burma. B.M. 5611. F.S. 22: 2329. G.C. 1867:180. C.O. 2.

9. **insígnis,** Blume. St. erect: lvs. linear, 10 in. long, apex with 2 or 3 teeth: raceme rather short, 6–10-fld.: fls. 2–2½ in. across; sepals and petals obovate, fleshy, the petals narrower, ochraceous brown, with darker brown blotches inside, almost white on the outside; labellum pandurate, the apical lobe being broadly reniform, concave, white tinted with rose. Summer. Malaya. B.M. 5759. Gn. 25:168. C.O. 3. Var. **Schroederiàna,** Hort., has yellow fls. with a white labellum, and 2 orange spots in front of spur. Gn. 25:168.

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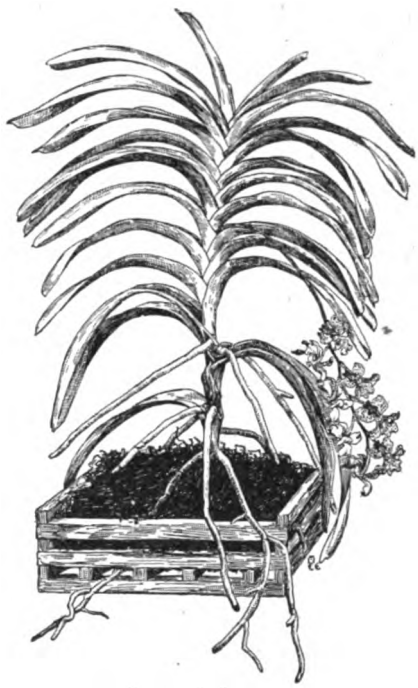
10. **tricolor,** Lindl. St. branched, tall, erect and leafy: lvs. strap-shaped, 10–12 in. long, channeled: raceme drooping, longer than the lvs.: fls. 2–3 in. across; sepals obovate, attenuated at the base, yellow with numerous brownish crimson spots; petals similar to the sepals in form and color but narrower; labellum about as long



3901. Vanda tricolor var. suavis.

as the sepals, lateral lobes small, rounded; middle lobe lyrate, notched, purple, with elevated lines. F.S. 6:641. I.H. 42, p. 161. B.M. 4432. J.F. 2:136. C.O. 6. Var. **suàvis,** Hort. (*V. suàvis,* Lindl.). Fig. 3901. Ground-color of the fls. white; sepals and petals spotted with purple; labellum deep purple. Fls. irregular from March to May. Java. B.M. 5174. F.S. 5, p. 510; 6:641. Gn. 3, p. 103; 23, p. 134 (as *V. tricolor*); 31, p. 242; 47:272. I.H. 42, p. 162. G.C. II. 22:237 (var.); III. 7:133 and 135. C.O. 4. Var. **Veìtchii,** Hort. Fls. with rather large spots of deep rose; labellum deep rose. R.B. 20:145. Var. **Pâtersonii,** Hort. Sepals and petals creamy white, heavily spotted with brown; labellum magenta-crimson. Gn. 23:134. Var. **Cŏrningii,** Hort. Sepals and petals bright yellow, spotted with deep crimson and bordered with rose-purple on both sides; labellum deep violet. Var. **tenebrôsa,** Hort. Sepals and petals yellow marked with dark red-brown; labellum rose-crimson. J.H. III. 47:3. Vars. **Robinsoniàna, grândis, spléndens,** and **supérba,** Hort., are also advertised.

11. **Rŏxburghii,** R. Br. (*V. tessellàta,* Hook.). St. 1–2 ft., climbing: lvs. narrow, complicate, 6–8 in. long, 2–3-toothed at the apex: racemes erect, 6–8-fld.: fls. greenish yellow, tessellated with olive-brown inside, white outside; sepals and petals subequal, clawed, obovate, waved; labellum nearly as long as the sepals, lateral lobes small, acute, middle lobe panduriform, violet, truncate. May–Aug. Bengal. B.R. 506. B.M. 2245. F.S. 2:75; 6, p. 330. I.H. 32:579 (var. *rubra*). P.M. 7:265. Var. **cærûlea,** Hort., is advertised.

12. **limbàta,** Blume. St. about 3 ft. high: lvs. linear, keeled, 6–8 in. long, unequally bifid at the apex: racemes 10–12-fld., 6–8 in. long on peduncles of equal length: fls. 2 in. across; sepals and petals spatulate, bright cinnamon, tessellated, bordered with golden yellow, white suffused with lilac outside; middle lobe of the labellum oblong-pandurate, truncate, mucronate, pale lilac. June, July. Java. B.M. 6173.

13. **Pârishii,** Reichb. f. St. very short: lvs. few, 8–10 in. long, 2–3 in. wide, obtusely 2-lobed: raceme drooping, 6–8-fld., on a short peduncle: fls. 2 in. across, fleshy, greenish yellow, freely spotted with reddish brown; sepals broadly ovate-oblong; petals orbicular; labellum half as long as the sepals, white striped with orange at the base; lateral lobes rounded, middle lobes flabelliform. Summer. Moulmein, India. C.O. 11. Var. **Mariottiàna,** Reichb. f. Sepals pale mauve with numerous darker blotches outside, petals mauve; both sepals and petals are mauve inside; labellum white at base, with yellow spots and mauve lines. C.O. 11*a*.

14. **densiflòra,** Lindl. (*Saccolàbium gigantèum,* Lindl.). St. short, thick: lvs. very thick, 6–12 in. long, notched: raceme dense, cylindrical, about as long as the lvs., nodding: sepals white, cuneate-ovate, subacute; petals narrower, with few purple spots at the base; labellum cuneate, obtusely 3-lobed, with 2 pubescent ridges at the base, terminal lobes bright shining purple. Winter. Burma. B.M. 5635. F.S. 17:1765. C.L.A. 6:164. Var. **illûstris,** Reichb. f. Raceme and fls. larger: sepals and petals spotted with purple; labellum bright purple. I.H. 31:517.

15. **Amesiàna,** Reichb. f. St. very short and stout: lvs. fleshy, rigid, almost terete, with a groove down the center, 6–12 in. long: raceme simple or branched, erect, 1–2 ft. long and bearing 20–80 fls.: fl. 1½ in. across, white, with rose-colored ridges on the labellum, sepals and petals ovate-oblong, obtuse; labellum with a broadly cuneate, undulate middle lobe, having 5 ridges converging into a reflexed callus, side lobes small, rounded. Flowers at various seasons. India. B.M. 7139. J.H. III. 29:491; 33:271; 48:315. G. 32:183. C.O. 1. A.F. 6:441. Var. **álbens,** Hort. Fls. almost entirely white.

16. **Kimballiàna,** Reichb. f. Fig. 3902. St. 6 in. high, probably climbing to a great height: lvs. 6–10 in. long, terete, with a deep, narrow furrow: peduncle slender,

3902. Vanda Kimballiana. (×⅓)

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6–10 in. long, bearing a drooping raceme 8–10 in. long: fls. 2–3 in. across; petals and dorsal sepal obovate-spatulate, lateral sepals very much larger, oblong, falcate, all pure white; labellum smaller than the lateral sepals, middle lobe orbicular, notched, rose-purple with darker veins, margin erosely toothed, lateral lobes small, yellow; spur 1 in. long, curved. Autumn. Burma. B.M. 7112. Gn. 37:322. R.H. 1897:352. Gt. 45:1428 and p. 338. J.H. III. 20, p. 41; 29, p. 53. G.C. III. 6:335; 17:69; 31:384. G. 29:669. C.O. 7. A.G. 12:89. Var. **álba,** Hort. Fls. white with yellow base to lip.

17. **tères,** Lindl. Fig. 3903. St. long, climbing: lvs. terete, 6–8 in. long: peduncle 6–12 in. long, bearing a 3–6-fld. raceme: fls. 4 in. across; sepals nearly orbicular, white tinged with rose; petals a little larger, deep rose; side lobes of the labellum broad, incurved, yellow spotted with crimson, middle lobe exceeding the sepals, fan-shaped, reniform, purple or rose-colored. May–Sept. Burma. B.M. 4114. B.R. 1809. P.M. 5:193. R.H. 1856:421. Gt. 43:1404. G.C. II. 20:273; III. 27:307. G.M. 43:298. C.O. 10. S.H. 2:385. Gn. 42:276.—A plant of straggling habit, but with very beautiful fls. Var. **Ándersonii,** Hort., has fls. larger and more highly colored. Var. **álba,** Hort. Fls. white. G. 36:373.

3903. Vanda teres. (Detached flower ×½).

18. **Hookeriàna,** Reichb. f. St. and lvs. terete, as in *V. teres*, but the latter only 2–3 in. long, and slender: fls. 3–5 in. across; dorsal sepal and petals white, dotted with purple; lateral sepals narrower, oblong or somewhat obovate, white; labellum as large as the rest of the fl., side lobes incurved, white and purple, middle lobe fan-shaped, with 3 large lobes, white spotted purple. Sept. Borneo. I.H. 30:484. Gn. 23:10. G.M. 40:645. Gn.W. 8:53.—In cult. racemes usually 2-fld.

19. **Cáthcartii,** Lindl. St. 1–2 ft.: lvs. linear-oblong, 6–8 in. long, unequally bifid at the tips: racemes longer than the lvs., 3–6-fld.: fls. 2½ in. across, orbicular in outline; sepals and petals nearly equal, orbicular-oblong, concave, pale straw-colored, transversely streaked with numerous narrow red-brown lines; labellum shorter than the sepals; lateral lobes quadrate, incurved, white with red streaks; middle lobe reniform, margin white, slightly crenate, center thick, yellow with a crenate border. Spring. Himalaya. B.M. 5845. F.S. 12:1251. G.C. 1870:1409. Gn. 19, p. 351; 33, p. 224; 42, p. 276. R.H. 1900:452.—Found near waterfalls, where it is always kept damp.

20. **Sanderiàna,** Reichb. f. St. very leafy: lvs. rigid, fleshy, recurved, 1 ft. long, strap-shaped, truncate, with 2–3 teeth at the apex: raceme bearing about 12 fls. each 5 in. across, with the broad sepals and petals overlapping: sepals orbicular, the dorsal one smaller, pale lilac, dotted at the base, the lower pair tawny yellow veined and tessellated with brownish crimson; petals smaller, rhomboid obovate, colored like the dorsal sepals; lateral lobes of the labellum forming a cup-like base, middle lobe subquadrate, reniform, much smaller than the sepals, dull crimson. Sept. Philippines. B.M. 6983. I.H. 31:532. R.H. 1885:372. Gn. 25:104; 32, p. 399; 49, p. 88; 50, p. 480. J.H. III. 35:535; 57:149; 63:505; 69:199. F.E. 23:454. O. 1909:105. C.O. 12. G.C. II. 20:440. Gng. 6:115.—A very remarkable free-flowering species. Var. **Froebeliàna,** Cogn. Fls. very large, nearly circular in outline, richly colored. Var. **ròseo-álba,** Hort. Upper sepal and petals nearly white with purple spots; lower petals greenish with purple veining.

V. Bàtemannii, Lindl.=Vandopsis lissochiloides.—*V. cathàrtica*, Hort., is presumably an error for V. Cathcartii.—*V. confùsa* is a new name proposed for V. cærulescens var. Boxallii.—*V. cristàta*, Lindl. Sts. erect: sepals and petals yellow-green, the petals incurved; lip buff, striped with rich purple. B.M. 4304. B.R. 28:48.—*V. Dalleàna*=V. lamellata × V. Boxallii.—*V. Flòreyæ*. A natural hybrid. Resembles V. cærulea in habit, but fls. smaller, white with violet lip.—*V. gigantèa*, Lindl.=Vandopsis gigantea.—*V. Lòwei*, Lindl.=Renanthera Lowei.—*V. Marònæ*=V. teres × V. tricolor var. suavis.—*V. Nièmannii*.—*V. præmórsa*.—*V. pùmila*, Hook. f. Lvs. 4–8 in. long: racemes 3-fld.: fls. fragrant, ivory-white, 2–2½ in. across, the lip crimson-striped: sepals and petals oblong-spatulate. Sikkim. B.M. 7968.—*V. striàta*, Reichb. f.=V. cristata.—*V. Wàtsonii*, Rolfe. About 1 ft. tall: lvs. subterete, acute, up to 14 in. long, dark green spotted with brown on sheath: scape brown-spotted, 10–12-fld.: fls. white, the crest and interior of sac yellow spotted brown; sepals and petals obovate-spatulate; lip 3-lobed, the front lobe oval, fimbriate. Annam. B.M. 8109. G.C. III. 37:123; 43:131, 132.

HEINRICH HASSELBRING.
GEORGE V. NASH.†

VANDÓPSIS (like *Vanda*). *Orchidàceæ*. Includes two or three species of orchids which formerly have been united with Vanda or with Stauropsis. They are distinguished from allied genera by the labellum, which is firmly united with the column, not spurred, concave at the base, with the terminal lobe compressed laterally. In appearance these plants resemble robust vandas, with which they are usually classed for horticultural purposes. Treatment the same as for vanda.

lissochiloides, Pfitz. (*Vánda Bàtemannii*, Lindl.). Fig. 3904. St. 1–5 ft. high: lvs. strap-shaped, obliquely emarginate, 2 ft. long: raceme tall, erect, bearing 12 and more fls.: sepals and petals obovate, yellow, spotted with brownish crimson, purple outside; labellum crimson-purple or yellowish. July–Sept. Philippines. B.R. 32:59. F.S. 18:1921.—By some authorities retained in Stauropsis, and so described on p. 3233.

gigantèa, Pfitz. (*Vánda gigantèa*, Lindl.). St. pendulous: lvs. 1–2 ft. long, thick, flat, obtusely notched: raceme 10–15 in. long, decurved, many-fld.: fls. 3 in. across, golden yellow, blotched with cinnamon; sepals and petals spatulate-obovate; labellum white. Burma. B.M. 5189. I.H. 8:277. R.H. 1874: 290.

HEINRICH HASSELBRING.

VANGUÈRIA (the Madagascan name of *V. madagascariensis* is *Voa-Vanguer*). *Rubiàceæ*. Shrubs or trees, sometimes spiny or somewhat climbing in habit, adapted to the warmhouse and may be hardy in the extreme southern United States.

Leaves opposite or rarely pseudo-verticillate in 4's, oval: fls. small, white or greenish, in axillary clusters; calyx 5- or 4-lobed, lobes deciduous or rarely persistent; corolla hairy or not outside, usually furnished inside with a ring of deflexed pilose hairs; lobes spreading or reflexed; stamens 5, rarely 4; disk fleshy or depressed; ovary 5–3-celled; ovules solitary: fr. drupaceous;

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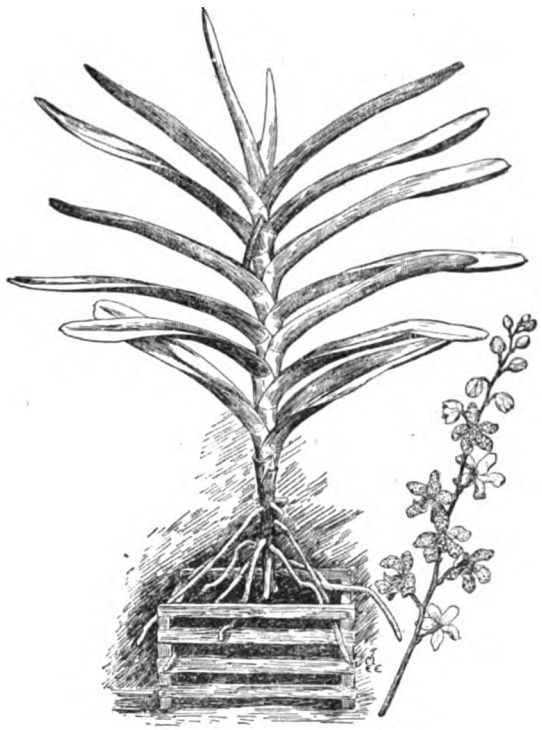
pyrenes 5–3 in number or putamen 5–3-celled.—About 70 species, tropical and subtropical regions of the world, Austral. excepted. Considered a section of Epimedium by Prantl, in Engler & Prantl, Pflanzenreich III. 2.

The voa vanga of Madagascar is a tropical fruit that has been recommended by the American Pomological



3904. Vandopsis lissochiloides.

Society as worthy of cultivation in southern Florida. The fruit is imperfectly described in horticultural writings. It is said to be a delicious berry ¾ inch thick, but in Mauritius it becomes 1½ inches thick. It is a globose drupe, shaped something like an apple and contains five large "stones" or bony pyrenes. The plant is a shrub 10 to 15 feet high. The species is widely spread in the tropics of the Old World. It was introduced to American horticulture by A. I. Bidwell, of Orlando, Florida. In 1887, the late H. E. Van Deman reported that the shrub grew exceedingly well, sprouting readily from the roots when frozen down. It grows readily from imported seeds.

madagascariénsis, J. F. Gmel. Glabrous shrub, 10–15 ft. high: lvs. very large, oblong, obtuse or acute, membranous, short-petioled: fls. in copious, peduncled, axillary dichotomous cymes; corolla funnel-shaped, ¼in. long, with 5 spreading deltoid teeth. Madagascar.

infaûsta, Burch. Shrub, 4–10 ft. high, tawny-tomentose, unarmed, sometimes a small tree: lvs. ovate, oval, or suborbicular, horizontal, usually rounded or obtuse at base, greenish above, rather paler beneath: fls. greenish, 5-merous, ¼in. long; calyx-lobes ovate or oval; corolla-tube cylindrical, glabrous, lobes ovate; ovary 5–3-celled: fr. globose, smooth, glabrous. Trop. Afr. B.M. 3014 (as *V. velutina*).—Fr. said by some to be edible. Intro. into S. Calif. F. Tracy Hubbard.†

VANHOÙTTEA (named for Louis Van Houtte, a Belgian nurseryman). Syn., *Hoùttea. Gesneriàceæ.* Low branching appressed-hairy shrubs, probably adapted only to warmhouse culture: lvs. opposite, fleshy, crowded at the ends of the branches, lower surface more or less canescent-felty: fls. solitary, axillary, long-pedicelled, red or speckled; calyx-tube adnate to the ovary, 5-ribbed, lobes elongated, acute; corolla-tube elongated-cylindrical, lobes 5, rounded, spreading disk broad with 5 glands, the 2 posterior usually grown together; ovary almost entirely inferior: caps. with a twisted beak. About 5 species, Brazil. *V. calcaràta,* Lem. (*Hoùttea pardìna,* Decne. *Gesnèra pardìna,* Hook.). St. about 1½ ft. high, erect, rather stout, terete, brown, branched: lvs. rather stoutly petioled, elliptical, acute, rather thick and fleshy, strongly serrated, downy above and more so beneath: peduncle axillary, solitary, 1-fld., shorter than the lvs.: calyx-tube turbinate, adherent with the lower part of the ovary, segms. large, acute, spreading; corolla 1½ in. or more long, ochre-red, yellow within, spotted with deep red, especially the limb and tube inside; ovary semi-inferior, hairy, with 5 yellow glands. Brazil. B.M. 4348. H.U. 6, p. 289. Cult. probably as for achimenes and similar plants. F. Tracy Hubbard.

VANÍLLA (Spanish, *little sheath* or *pod*). *Orchidàceæ.* Vanilla. Climbing orchids whose branched stems ascend to a height of many feet, ornamental but known mostly as the source of vanilla used for flavoring and which is produced from the seed-pods.

Nodes bearing lvs. or scales and aërial roots in alternate arrangement: fls. in axillary racemes or spikes, without an involucre at the top of the ovary; sepals and petals similar, spreading; labellum united with the column, the limb enveloping the upper portion of the latter; column not winged.—About 20 species in the tropics. The genus was monographed in 1896 by R. A. Rolfe in Journ. Linn. Soc., vol. 32.

The most important species is *V. planifolia,* the vanilla of commerce. It is a native of Mexico, but is now widely cultivated in the West Indies, Java, Bourbon, Mauritius, and other islands of the tropics, its chief requirement being a hot damp climate. The plants are propagated by cuttings varying in length from 2 to about 12 feet, the longer ones being the more satisfactory. These are either planted in the ground or merely tied to a tree so that they are not in direct connection with the earth. They soon send out aërial roots, by which connection with the soil is established. They are usually trained on trees so that the stems are supported by the forked branches, but posts and trellises are also used as supports. In most places where vanilla-culture is practised, pollinating insects are lacking and the flowers must be pollinated by hand. Plants bear their first fruit about three years after setting. They then continue to fruit for thirty or forty years, bearing up to fifty pods annually. The vanilla pods are picked before they are ripe, and dried. The

3905. Vanilla planifolia. Cluster of flowers about 4 inches across. (The pod × ⅓).

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vanillin crystallizes on the outside. For a full description of vanilla culture and methods of curing the pods, see Bulletin No. 21, United States Department of Agriculture, Division of Botany, by S. J. Galbraith. Vanillin is also made from other sources by chemical means.

planifólia, Andr. (*V. aromática,* Willd., in part). Common Vanilla. Vanilla Bean (from the pods). Fig. 3905. Tall climbing herbs with stout sts.: lvs. thick, oblong-lanceolate, acuminate, with short, stout petioles: fls. yellow, large, in axillary racemes of 20 or more blossoms; sepals and petals oblanceolate; labellum trumpet-shaped, with small, reflexed, crenulate lobes. Winter. A native of Mex., but widely cult. throughout the tropics and in greenhouses. B.M. 7167. L.B.C. 8:733. G.C. III. 25:213. Gn. 57, p. 35. O. 4:8.—Partially epiphytic.

aromática, Sw. St. angular: lvs. broadly ovate, with a bluntish point, contracted at the base: fls. greenish and white. Jamaica, Colombia, Trinidad.

V. Éggersii, Rolfe. Sts. thick: lvs. abortive, oblong-lanceolate: sepals and petals greenish; lip white or lilac. W. Indies.—*V. grandifólia,* Lindl. Lvs. 7 in. long, 5 in. broad, narrowed at base into more or less elongated petiole: fls. very large. W. Trop. Afr.—*V. Húmblotii,* Reichb. f. Fls. bright yellow, about 5 in. across, with brown markings on lip and rosy hairs in throat. Madagascar. B.M. 7996.—*V. Lùjæ,* Walden. Lvs. resembling V. planifolia: fls. very large. Congo.

Heinrich Hasselbring.
George V. Nash.†

VARIATION: See *Breeding,* page 547.

VARIEGATION. This term is usually applied to a class of variations, especially in leaf-coloration, in which the leaves become striped, banded, spotted, and blotched with yellow, white, red, and various other colors in connection with the normal green of other portions of the leaves. In the case of yellow-and-white variegation, the term albinism is sometimes used, especially when the plants are largely marked with white or yellow, as in *Abutilon Sellovianum, Pelargonium zonale,* and variegated forms of *Evonymus japonica, Hydrangea hortensis, Hedera helix, Polyscias Guilfoylei* var. *Victoriæ,* and others.

Among the dracenas, caladiums, and codieums, besides the white variegation, there are developed beautiful reds, pinks, yellows, and so on. As a rule, the term variegation is not used in cases of color-variation in which only the surface of the leaf is involved, as in many of the begonias, sansevierias (*S. thyrsiflora* and *S. zeylanica*), *Alocasia cuprea, Cissus discolor,* and others. In many such plants the markings are due in part to hairs, scales, or air in the cuticle or epidermal cells, as in sansevieria and begonia. In some begonias, many varieties of calathea (as *C. ornata* var. *albo-lineata*), the epidermal cells develop decided and definite color-variation, though the changes do not usually involve the mesophyl or inner cells of the leaf. In some genera, however, especially calathea, all gradations are found between purely epidermal variegation and changes involving the deeper layers of the leaf, as in *C. Veitchii* and *C. Makoyana.* The same is true of many other genera. Different kinds of variegation are shown in Figs. 3906, 3907.

3906. Variegation in abutilon.

True variegations may be distinguished from ordinary colorations, bleaching, chlorosis, and the like, by the fact that the colored areas are usually quite sharply defined. They do not gradually blend into each other, but have definite boundaries. Cells in the variegated areas are found, as a rule, to contain the same chlorophyl bodies (chromatophores) as the ordinary green cells of the plant. However, in the variegated parts, the green color is not developed, and the chromatophores are often smaller or are somewhat swollen and vacuolate. In the case of chlorosis due to the lack of iron, or yellowing due to the lack of light, a leaf will quickly develop its normal color if given the proper conditions. This is not the case, however, in variegated leaves. While the intensity of whatever color the chromatophores may have can be varied by light and food, a variegated cell can never be changed by these means to a normal cell.

The chlorophyl granules (chromatophores) appear to have lost entirely, in many cases, the power to make starch and sugar from the carbonic acid gas in the air, and in other cases this power is very greatly reduced. In practically all cases, however, when the chromatophores are not destroyed, they retain the power to convert sugar into starch and they thus store up starch in their tissues from the sugar manufactured by the healthy cells of the leaf.

White or albino variegation is of course due to a lack of any coloring in the chromatophores, and sometimes to the entire absence of these bodies. The cells seem to have lost completely the power of making chlorophyl. These albicant variegations are to be looked upon as the more extreme forms of variegation, and usually arise through a feeble or atrophied condition of the plant. Seedlings raised from parents both of which are variegated in this way are usually very weak. High feeding and favorable conditions of growth, while they will not cause a variegated plant to return to its normal condition, will often stimulate the development of a normal green shoot that takes most of the nourishment and thus causes the starvation and disappearance of the albicant parts. In other cases, as in codieums, modified chlorophyl is made. Large yellowish oil-like drops occur in the substance of the chromatophores, and the various changes that these undergo, as the leaf becomes older, produce the remarkable and beautiful colorations of this group of plants. The coloration here, as in dracenas and caladiums, is intensified by strong light and nourishing food. The more of the modified chlorophyl there is produced and the more rapid the changes in the modified chlorophyl brought about through the action of light and the acids and oxidizing ferments of the leaves, the more highly developed will be the colors, though here again high feeding is likely to cause the plant to revert to its normal condition.

Variegated plants or parts of plants are usually of slower growth and smaller than green plants of the same variety or the green parts of the same plant.

Variegation occurs either by bud-variation or by variations in seedlings. In the former, a variegated branch is likely to appear on an otherwise perfectly normal plant. Such variegations are easily reproduced by budding, grafting, or cuttings, but generally do not develop again from seeds produced on such branches. On the other hand, when variegation develops in seedlings, the seeds of such plants usually give a number of variegated individuals, even the cotyledons being sometimes affected. In some cases the proportion of variegated plants from seeds is very large and can be increased by selection. As a rule, the form of

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spotting or marking is not constant in seedlings, often being very different from the parent. In certain groups of plants, which have for many years been selected on account of the horticultural value of these markings, the variegated condition has become almost a fixed feature of the plant, as in dracenas, caladiums, and codieums. While the plants of these genera are not usually propagated from seeds, still when they are so propagated, a large number of seedlings show more or less variegation.

Darwin and many of the earlier investigators believed that these variations were started in the plant by unfavorable nutritive conditions, and much has been written on the subject as to whether or not variegations should be considered as diseased conditions.

The question as to whether a variegated condition could be transmitted to normal plants by budding and grafting has also been much disputed, but the weight of evidence indicates that in many cases such transmission certainly takes place. This has been thought to indicate the presence of some micro-organism, living either parasitically or symbiotically in the plant, and causing the changes known as variegation.

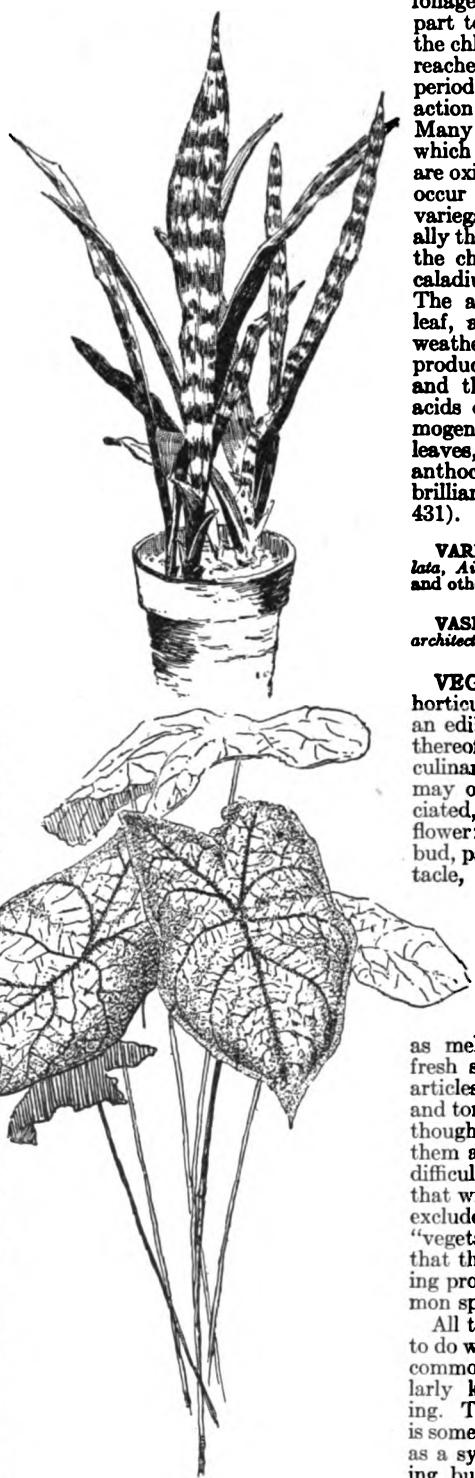
Investigations conducted by the writer on the so-called mosaic disease of tobacco, which is a form of variegation, and also on many other forms of ordinary variegation, show quite conclusively that the disease is not caused by micro-organisms, but is due to a deranged condition of the nutrition of the cells. Without going into the details of the matter, it may be said that the condition is characterized physiologically by a marked increase in the oxidation processes in the cells, caused by the presence of an abnormal amount, or an abnormal activity, of oxidizing ferment in the protoplasm.

These changes must, in most cases, therefore, be considered as pathological in their nature, as the vitality and vigor of the plants are reduced as a result. It is further evident that the initial causes of variegation may be quite diverse, some of the most usual being seed of low vitality; unsuitable nourishment, especially a lack of elaborated nitrogen; rapid growth in very moist soil; severe injury to the roots during a period of rapid growth of the upper parts of the plant; severe cutting back, and the like.

Though started at first through the influence of environment, variegation, when of value horticulturally, has in many cases been increased and fixed by selection till it has become almost a specific character in some groups of plants, and is considered in the botanical description of them.

A word might be said in this connection regarding autumn coloration. The production of color in autumn foliage is, as is well known, due in part to the gradual destruction of the chlorophyl when the leaves have reached maturity and approach the period of death, and in part to the action of acids on anthocyanin. Many of the destructive changes which take place in the chlorophyl are oxidation processes, the same as occur in the cells of highly colored variegated plants, and physiologically they are not very different from the changes occurring in calathea, caladium, codieum, and the like. The approach of maturity in the leaf, and the coming on of cool weather in autumn, stimulates the production of oxidizing ferments, and the action of these and the acids of the cell-sap on the chromogen, or color contents of the leaves, especially the chlorophyl and anthocyanin, causes many of the brilliant colors of autumn foliage (p. 431).

ALBERT F. WOODS.



3907. Kinds of variegation. Sansevieria above and caladium below.

VARNISH TREE: *Kelreuteria paniculata, Ailanthus altissima, Rhus verniciflua,* and other plants.

VASES: See *Topiary planting and garden architecture,* Vol. 5, p. 2675.

VEGETABLE-GARDENING. In horticultural usage a vegetable is an edible herbaceous plant or part thereof that is commonly used for culinary purposes. The product may or may not be directly associated, in its development, with the flower: the root, stem, leaf, flower-bud, partially developed seed-receptacle, mature seed-receptacle, or seeds (either immature or mature), may constitute the edible part. Some vegetables are edible only after being cooked, others (such as cabbage), are eaten either cooked or raw, while others, as melons, are used only in the fresh state, and are really dessert articles. In some countries, melons and tomatoes are regarded as fruits, though American usage classifies them as vegetables. Although it is difficult to make a general definition that will include all vegetables and exclude none, the use of the term "vegetable" is so well understood that there is little difficulty in making proper application of it in common speech.

All the art and science that has to do with the growing of the plants commonly called vegetables is popularly known as vegetable-gardening. The Latin term, olericulture, is sometimes used in formal writings as a synonym of vegetable-gardening, but has never become popular. Vegetable-gardening is usually considered as a branch of horticulture,

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coördinate with pomology (fruit-growing) and floriculture. However, certain vegetables, such as potatoes, when grown in large areas in rotation with general farm crops, are sometimes looked on as agricultural rather than horticultural subjects.

Some of the crops may be classified as horticultural or agricultural depending on the uses for which they are to be employed. For example, beans that are grown for the green pods are horticultural subjects, but if the same varieties were to be grown for the mature seed for selling in the general market, they may be known as agricultural products. In like manner turnips may be horticultural subjects when grown in small areas for home or table use, but agricultural subjects when grown on large areas for stock-feeding.

Vegetable-gardening may be divided into two great categories, depending on the disposition that is to be made of the products; namely, commercial gardening (see page 1997, Vol. IV, the article *Market-Gardening*), of which the purpose is to make money from the industry; and home- or amateur-gardening, in which the purpose is to raise a supply for family use. Commercial vegetable-gardening may be divided further into four fairly well-defined types: market-gardening proper, truck-gardening or truck-farming, forcing (see Vol. III, page 1254), and the growing of vegetables for canning or pickling factories.

Market-gardening proper involves intensive methods of culture, and is most highly developed near large cities. Truck-farming involves the growing of one or a few special vegetable crops, often as an adjunct to a system of general farming. These are usually grown in relatively large areas, and at considerable distance from market. Questions of climate, soil, and shipping facilities largely determine the location of truck-gardening areas. The South produces early vegetables for northern markets; the North produces cool-climate crops for winter storage, such as onions, cabbage, turnips. Sweet corn, tomatoes, and peas for canning purposes, and cucumbers for pickling, are grown where the soil and climate are especially adapted to their culture.

Particular regions have become famous for the production of certain vegetable crops. Some examples are: Eastern Long Island for late cauliflower; Kalamazoo, Michigan, for celery; Rocky Ford, Colorado, and the Imperial Valley, California, for muskmelons; certain areas in Georgia for watermelons; southern Texas for the Bermuda type of onion; Norfolk, Virginia, for spinach, kale, and early potatoes; Ontario for turnips and other root-crops. Long-distance transportation has revolutionized vegetable-gardening in this country (see *Packing*, *Transportation*), and crops which were formerly grown only near market and had a limited season are now shipped across the continent, and may be procured in the same market, from some source, twelve months in the year. Head lettuce is an example.

The practices.

While in commercial vegetable-gardening the location is determined to considerable extent by soil and climate, in the home-garden the climate and the soil are largely beyond the choice of the gardener, since these matters are determined by the location of the homestead. The general effort in the home-garden is to secure products of high quality and to have a more or less continuous supply throughout the season. In market-gardening emphasis is usually placed on a few crops, whereas in home-gardening it is placed on a great variety of crops.

The old-time home vegetable-garden or "kitchen-garden" was generally unsuited to the easy handling of the soil and to the efficient growing of the plants. Ordinarily it was a small confined area in which horse-tools could not be used (Vol. III, page 1738). The rows were short and close together, so that finger-work was necessary. The custom arose of growing crops in small raised beds, probably because such beds are earlier in the spring than those that are level with the ground. With the evolution of modern tillage tools, however, it is now advised that even in the home-garden finger-work be dispensed with as much as possible. Some of the very earliest crops may be grown in raised beds to advantage, but in general it is better to secure earliness by means of glass covers or by ameliorating the entire soil by underdrainage and the incorporation of humus and by judicious tillage. See *Tillage* and *Machinery*. In the home-garden on the farm particularly it is desirable that the rows be long and far enough apart to allow of tillage with horse-tools.

Vegetable-gardeners are usually large users of stable-manure. Near the large cities the manure is bought in carload lots or hauled with four-horse teams, and it is used every year or even two or three times a year. The reason for this frequent and heavy use of manure is the necessity of improving the physical texture of the land so that it will be loose, open, and mellow, be early or "quick," and hold an abundant supply of moisture. In intensive vegetable-gardening there is no "resting" of the land and no green crops to be plowed under. The vegetable matter, therefore, has to be supplied almost entirely by barn-manures. In the larger and less intensive vegetable-growing farther removed from large cities, general agricultural practices can be employed to better advantage, such as rotation and green-manuring. Vegetable-gardeners, especially in the East and South, generally use largely, also, of concentrated fertilizers.

In intensive vegetable-gardening it is important to start many of the crops under glass and to transplant the young plants to the open as soon as settled weather comes. See *Transplanting*. This is particularly true of tomatoes, very early lettuce, sweet potatoes, egg-plants, peppers, and the early crops of celery, cabbage, and cauliflower. In the northern states muskmelons and sometimes watermelons and cucumbers are started under glass, being grown in pots, veneer "dirt bands," or upon inverted sods, whereby they are transferred to the open without disturbing the roots. Formerly the plants were started under hotbed or coldframe structures, but of late years there has been a great increase in the extent of glass-houses or forcing-houses. These are primarily for the purpose of growing certain crops to maturity outside of their normal season in the given locality, but are often used a part of the season for starting plants intended for transplanting. In these structures conditions can be controlled better than in hotbeds, and they are especially valuable for the starting of very early plants in cold weather. However, hotbeds and coldframes are still exceedingly important adjuncts to the vegetable-garden. They are almost indispensable for the reception of early plants that have been started in a greenhouse and require "hardening-off" before transplanting into the open ground. They can be moved when the person shifts to other land, and the space that they occupy can be utilized for outdoor crops later in the season. They are extensively used for starting early plants. Much vegetable-gardening in large cities is prosecuted on rented lands; therefore it may not be profitable to invest in such permanent structures as forcing-houses. The first cost of hotbeds and coldframes is less than that of forcing-houses, and this is often a very important item. For management of glass structures, see *Hotbeds*, *Greenhouse*, *Forcing*.

The seed and variety problem is most complex. A mistake in the selection of a strain or kind may mean inability to meet a market demand either as regards characteristics or season. A round cabbage crowds out a pointed form. As soon as they mature, better varieties crowd out the Earliana tomato. Therefore the gardener must know varieties. Many seedsmen are making sincere efforts to provide good seed, and each

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CXV. A market-garden of the modern type near a city; overhead irrigation.

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year sees progress. Much remains to be accomplished in study and classification of varieties and types, and in the improvements of methods of seed-breeding and production. These problems are especially difficult because the crops are chiefly annuals, and changes take place with great rapidity. Experiment stations are now taking up this work on a sound scientific basis, a thing that could hardly be said of most early taxonomic studies. They are enjoying the coöperation of seed houses.

There are great numbers of insect and fungous pests that attack the vegetable-garden crops. See article on *Diseases and Insects*. The spray-pump has now come to be a necessary adjunct to any efficient vegetable-garden. However, there are many difficulties beyond the reach of the spray, particularly those that persist year by year in the soil or which attack the roots rather than the tops. For such difficulties, the best treatment is to give rotation so far as possible and to avoid carrying diseased vines back on the land the next year in the manure. Even the club-root of cabbage can be starved out in a few years if cabbages or related plants are not grown on the area.

In its best development vegetable-gardening is essentially an intensive cultivation of the land. Often it is conducted on property that is too high-priced for ordinary farming. Land that demands rent on a valuation of $1,000 an acre is often used for vegetable-gardens; and higher-priced land, held for other uses later, may be used temporarily. There is also intense competition near the large cities. These circumstances force the gardener to utilize his land to the utmost. Therefore, he must keep the land under crop every day in the year when it is possible for plants to live or grow. This results in various systems of succession-cropping and companion-cropping, whereby two or more crops are grown on the land the same season or even at the same time. (For examples of companion-cropping, see *Market-Gardening*.) Market-gardening is usually a business that demands enterprise, close attention to details, and much physical labor. If, with his knowledge of vegetable-growing, the gardener combines good business and executive ability, and an intimate knowledge of market conditions, he should be able, however, to make it a profitable and attractive business. Although the outlay is likely to be large, the returns are direct and quick.

Extent and growth of the industry.

The most recent published statistics of vegetable-gardening in the United States are those of the Thirteenth Census, 1910. According to the report of this census, based on the crop of 1909, the acreage devoted to vegetable production in the United States was 7,073,379 acres, including 3,668,855 acres of potatoes. The total value of all vegetables reported for that year was $418,110,154. Of the total number of farms in the United States, 4,969,540, or 78.1 per cent reported having farm-gardens; 4,261,776 gave the acreage devoted to vegetables and the value of the product 41,731 farms reporting vegetables to a value of over $500 each, and 4,220,045 farms less than $500 each. "Farms of the former group usually produce vegetables chiefly for sale and make them an important part of their business, while on a large proportion of the other farms vegetables are raised only for home consumption." In 1909, the value of the vegetable crop (including potatoes) in the following states amounted to over 10 per cent of the total value of all crops in the respective states: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Michigan, Delaware, Maryland, Virginia, West Virginia, Florida, Colorado, Nevada.

According to the figures, the production of vegetables between 1899 and 1909 increased from $237,000,000 to about $418,000,000. This includes the potato, which is grown partly as a farm crop and partly as a vegetable-garden crop. With this most important commodity omitted, the corresponding figures for the miscellaneous vegetables are $139,000,000 and $251,000,000. The increase in the production of all other horticultural products, including fruit, flowers, nursery products and nuts, is from $152,000,000 to $273,000,000.

A map showing centers of vegetable production in the United States would show changes no less marked. New districts have been established almost without number in all sections of the country. The business is much more evenly distributed throughout the United States than formerly, and the states that have been regarded as great trucking states are no longer holding their preëminence without question. Thus, Illinois and Indiana have become great vegetable states, with the market-gardening for Chicago, trucking in southern Illinois for both Chicago and St. Louis, muckland trucking in the swamplands (see *Muckland-Gardening*, Vol. IV), and production of crops for the cannery. Similar statements might be made of other states. Ten years ago, truck-farming was thought of principally as production of vegetables in the South for shipment North. The advance in the importance of vegetables in the dietary, together with the rapid growth of the more southerly cities, has brought about a marked development in the production of vegetables in northern parts for shipment southward, particularly the cool-season crops for consumption when the gardens of the warmer climates are practically unemployed on account of the heat. The production of cabbage and potatoes in the North for shipment southward has long been a great industry, but of recent years important centers in the growing of cucumbers, peas, beans, and of the muckland crops, celery, lettuce, and onions, have been developed. Improved transportation facilities have made California an important source of supply for eastern markets.

The canning industry as connected with vegetable-gardening has been an important factor in making possible a continuous supply of vegetables throughout the year, and this industry has recently made much progress. Three phases of this industry utilize vegetable-garden crops—factory, farm, and home canning. Factory canning uses the products from a comparatively large acreage of crops on the truck-gardening or general farming scale. Corn, tomatoes, peas, and string beans are extensively handled by canning factories. Farm canning promises to be a means whereby the market-gardener or truck-farmer may turn his crops into greater profit when markets are glutted. Home canning is a means of preserving a supply of perishable vegetable products from one's kitchen-garden for home use.

The insistence of the population on a supply of vegetables through all the months has made possible the construction of greenhouse ranges, many of which are now measured in acres. The crops are lettuce, cucumbers, tomatoes, and radishes in the order named. While the business is not so satisfactory in the autumn months, because of poor growth conditions and on account of light demand, the returns after the first of the year are sufficient to render the business profitable and to justify increases in the areas under glass.

Market-gardening has kept pace with the growth of the cities, although some of the famous centers are declining on account of the great increase in real-estate values. The auto truck is an important factor in making it possible for the gardener to take advantage of the lower interest charges incident to the use of more distant lands.

In the practice of vegetable production, the most conspicuous development has been the introduction of overhead irrigation. Hundreds of acres are now watered in this way. The value of this practice is evident when it is considered that moisture is more often than otherwise the factor which prevents the gardener from reap-

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ing returns from improvements which are far more costly than in other lines of agriculture.

The past ten years has seen the beginning of organization among vegetable producers. Coöperative selling is becoming a larger factor in the selling of produce on distant markets, and garden districts not yet ready for coöperative selling are finding material advantage in unified action in matters of the gathering of information as to their methods, in the purchase of supplies, the standardization of packages, the improvement of local market conditions, and of transportation facilities, in overseeing legislation and securing assistance through investigational agencies in the solution of local problems. The Vegetable Growers' Association of America was organized in 1908 and has brought into contact with one another a large group of men from all sections of the country. The New York State Vegetable Growers' Association, formed in 1911, has been the pioneer in state organization. All of these societies, national, state, and local, are finding new fields of usefulness and are each year serving directly an increased proportion of the men in the business, while all find advantage through their promotion of the general welfare.

Education; literature.

For many years a course in vegetable-gardening has been included in the curricula of most of the agricultural colleges of the United States and Canada, and more or less attention has been given to research in vegetable-gardening problems on the part of agricultural experiment stations. However, until within the last few years, both the teaching and research in reference to this subject were in most institutions conducted as incidental matters by some member of the staff whose principal energies were demanded by other horticultural interests. At the present time much more attention than formerly is being given the subject of vegetable-gardening in educational institutions, and many of the agricultural colleges and stations now have one or more men devoting their entire time to vegetable interests. In some of the institutions several courses are offered in vegetable work, including an introductory course, an advanced course in market-gardening, and courses in vegetable-forcing, systematic vegetable crops, and undergraduate research. Provision is also made for graduate work in problems bearing on vegetable-gardening.

Vegetable-gardening is also found to be especially adapted for use as a basis for giving instruction in the fundamental principles of crop production in schools, especially in those having only a limited area of land available for "laboratory" purposes. The simple equipment involved, the possibility of using odd bits of ground, the relatively short time in which results can be expected, and the high value of the product to be derived from a small area, together with its easy adaptation to educational purposes, all render this phase of agriculture especially serviceable in such activities. The work is conducted on special plots laid out for that purpose, and on the home farms and back yards.

There is a large literature devoted to vegetable-gardening, although much of it applies chiefly to amateur or home growing. Leading current books on the general subject of vegetable-gardening are those by Greiner, Green, Henderson, Rawson, Landreth, Bailey, Watts, Lloyd, and Corbett. For California one should consult Wickson's "California Vegetables in Garden and Field," and for the Atlantic South, Rolfs' "Vegetable-Growing in the South for Northern Markets," Oemler's "Truck-Farming at the South," and Rolfs' "Subtropical Vegetable-Gardening." There are many books devoted to special topics, and there are many others which in their time were of great practical value, but which are now chiefly known as recording the history of the epoch in which they were written. Only one American work has been devoted to descriptions of varieties of vegetables, as the works of Downing, Thomas, and others have to varieties of fruits. This work is Fearing Burr's "Field and Garden Vegetables of America," Boston, 1863, and the abridgment of it in 1866, called "Garden Vegetables and How to Cultivate Them." A list of the American vegetable-gardening literature to that date may be found in Bailey's "Principles of Vegetable-Gardening" (1901). See also *Horticulture, Literature of*, Vol. III. Persons who desire a cyclopedic account of vegetables should consult Vilmorin's "Les Plantes Potagères," an English translation of the first edition of which is published in London as "The Vegetable Garden." Odd and little-known vegetables are treated in Paillieux & Bois, "Le Potager d'un Curieux," Paris, 3d ed. 1899.

L. H. B.
JOHN W. LLOYD.
PAUL WORK.

Vegetable-growing in California.

It is an interesting fact that although California's horticultural prominence now rests on fruit products, the first attraction to the new state, after the gold discovery, was the wonderful growth of garden vegetables. The reports of immense size, of acreage product and of prices secured, were almost incredible because so much in advance of ordinary standards, but the statements were so fully authenticated that many were drawn to California by them. These horticultural pioneers, however, soon found that immigrants from Asia and the Mediterranean region, by their cheap living and by doing their own work, could cut under American growers who had to employ high-priced labor, and so the latter retired from the field, leaving the opportunity to the frugal and thrifty foreigner. Thus vegetable-growing, from an American point of view, came into disrepute and largely retains such disadvantage at present. The result is that the American largely avoids market-gardening, while Asiatics and South Europeans are thriving on it. There has been a reflection of the same disfavor in the farm growing of vegetables for home use, and our farming population, including the fruit-growers who should know and do better, is largely dependent on alien vegetable peddlers or products of canneries instead of fresh home-grown esculents, which would be cheaper and inexpressibly better than canned or transported supplies.

Fortunately there arose about twenty-five years ago a large industry in growing vegetables for overland shipment and for canning which clothed the plant-cultures involved in this trade with a new dignity and importance attractive to American growers. Cabbage, cauliflower, and celery for eastern shipment, asparagus for canning and for shipment, tomatoes for canning, and the like, have all become large special crops, while some other plants, like lima beans, which are chiefly grown in gardens elsewhere, have become field crops in California covering very large acreage. Such enterprises have enlisted American citizens and changed the popular conception of the dignity and opportunity of vegetable-growing. A measure of this influence, as well as of the extent of the product, may be had in the average annual shipments of green vegetables beyond state lines for several years ending with 1914:

Vegetables	Carloads
Artichokes (Globe)	150
Asparagus	350
Celery	2,500
Cauliflower	1,000
Cabbage	1,000
Potatoes	10,000
Lettuce	300
Tomatoes	2,000
Mixed vegetables	1,000

The canned-vegetable output of 1914 was 2,373,182 cases (each containing twenty-four 2½-pound tins)

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divided as follows: asparagus, 800,380; string beans, 81,905; peas, 188,667; tomatoes, 1,183,705; other vegetables, 119,525.

In addition to the foregoing there is the dry-bean product, which reached a total of 3,670,000 bags of 80 pounds each in 1915, and of sugar beets which was 203,200 tons in 1915.

California conditions affecting vegetable-growing are wide and various. Nowhere else perhaps is it more essential that certain things should be done just at the right time and in the right way. If these requirements are fairly met the product is large and fine; if they are neglected the failure is sharp and complete. This fact has given rise to the impression that California is a hard place to grow vegetables, which is not true unless one lacks local knowledge or the nerve to apply it. One of the chief causes of failure is in following seasons and methods which have yielded success under conditions prevailing in the states east of the Sierra Nevada Mountains. If one begins garden-making in the springtime the plants do not secure deep rooting, which is necessary to carry them to success in the dry season, and the garden is likely to be a disappointment. If, on the other hand, all the hardier vegetables are sown in succession from September until February or March, there will be continuous produce through the winter and into the early summer. The chief shipments of vegetables from California are made during the late fall and winter and are taken right from the ground to the cars without protection or storage. Tender vegetables, like corn, beans, tomatoes, and the like, however, can be grown in the winter only in a few frostless places. They must either be pushed to a finish in the fall or sown early in the spring and carried into the dry summer as far as necessary either by natural moist land or by irrigation. There are a few localities, however, where tomatoes will fruit early in the spring from fall plantings, and peppers will live through the winter and bear a second season's crop on the old plants.

The possession of an irrigation supply is the secret of full satisfaction in California vegetable-growing, but a small amount of water, if skilfully applied, will work wonders. Irrigation will enable one to have something crisp and delicious in the garden every day in the year in the California valleys. It is true, however, that much can be done without irrigation by beginning at the opening of the rainy season in September, growing the hardier vegetables while moisture is ample even on the drier lands during the late fall and winter, and keeping the lower lands well plowed and cultivated to prevent evaporation until the tender vegetables can be trusted in the open air, and continuing cultivation assiduously afterward so that moisture can be conserved in the soil as long as possible for them. That this is thoroughly practicable is seen in the fact that the large lima-bean product is grown almost entirely without irrigation from plantings made as late as May and the whole growth of the plant is achieved without a drop of water except that stored in the soil. The same is true of the corn crop; perfect corn can be grown without a drop of rain or irrigation from planting to husking. In such cases, however, the winter rains are retained in the soil by cultivation. If winter growth is made by rainfall, summer growth can be had on the same land by irrigation. In this way irrigation becomes eminently desirable in securing all-the-year growth, which cannot be had by rainfall. With good soil and abundant irrigation it is possible to secure four garden crops in rotation within the year—the hardy plants in the fall and winter months; the tender plants in the spring and summer. Of course the adjustment of all these means to desired ends requires good perception and prompt action, and explains why those who have been accustomed to plant at a fixed date and do little but cut weeds afterward may find it hard to secure the best results in California. And yet the Californian grower has great advantages in his deep rich soil, in freedom from many diseases (which thrive in a humid atmosphere) and in an exceedingly long growing season.

Local adaptations for different vegetables are sometimes quite sharply drawn and selection of lands for large specialty crops must be made with reference to them. The result is that the earliest vegetables come from practically frostless places in the Colorado River region of southeast California; almost all the lima beans are grown on a coast plain from Santa Barbara southward; the celery for eastern shipment is nearly all grown on the peat lands of Orange and San Joaquin counties; the cabbage comes largely fron San Mateo County; asparagus and tomatoes from Alameda County and river islands of Sacramento and San Joaquin counties, and so on. Smaller areas of these products and others not mentioned are more widely scattered, but everywhere the local soil, exposure, and climate are chief considerations.

There is prospect of great increase in all the vegeable products of California. Fresh and dried vegetables enter largely into ocean traffic with distant Pacific ports. Interstate trade is constantly increasing and canned vegetables are contracted in advance to European distributors as well as to dealers in all the Americas.

E. J. WICKSON.

VEGETABLE MARROW: see page 2861. **V. Orange:** *Cucumis Melo* var. *Chito.* **V. Oyster:** *Salsify.* **V. Pomegranate:** *Cucumis Melo* var. *Dudaim.* **V. Sponge:** *Luffa.*

VEÌTCHIA (James Veitch, of Chelsea, famous English nurseryman). *Palmàceæ.* About 4 species of pinnate palms native to the Fiji Isls. and New Hebrides. The genus belongs to that section of the Areca tribe characterized by a parietal ovule which is more or less pendulous and fls. spirally disposed in the branches of the spadix, and is distinguished from Hedyscepe and allied genera by the following characters: sepals of the male fls. chartaceous, connate at base; female fls. much larger than the males. It is doubtful whether any species is now in the trade. *V. Jodnnis,* H. Wendl., was cult. early in 1880–90. Lf.-segms. with a wide and rather shallow notch at the apex or obliquely truncate; sheath, petiole and rachis a dark blood-color and covered when young with a gray tomentum interspersed with lanceolate, thin, dark red scales: fr. 2½ x 1¼ in., ovoid-ellipsoid, orange, with a red base. G.C. II. 20:205. R.H. 1883, p. 344. Has been cult. in S. Calif. but is tender there. It has been conjectured that *Kentia Van Houttei* advertised in 1895 by American dealers may be a species of Veitchia. The genus is imperfectly known and of minor importance horticulturally.

VELLÒZIA (Velloz, a Portuguese naturalist). *Velloziàceæ;* or *Amaryllidàceæ.* Usually shrubs, sometimes arborescent, adapted to the warmhouse. Sts. fibrous-woody, usually dichotomously branched: lvs. linear, rigid, tufted at the ends of the branches: peduncles 1-fld.: fls. usually white; perianth funnel-shaped; segms. subequal, ovate-lanceolate; stamens 6, sometimes many; ovary clavate, 3-celled; ovules many, superposed: caps. coriaceous, dehiscing at the apex.—About 65 species, Trop. and S. Afr., Madagascar and Brazil. Vellozia is closely related to Barbacenia but distinguished by having more than 6 stamens, whereas Barbacenia has only 6. *V. trichophýlla,* Hemsl. (*V. equisetoìdes,* W. Wats., not Baker. *V. equisetoìdes* var. *trichophýlla,* Baker). Shrub having a thick caudex, 1 ft. or more diam. and short thick primary branches: lvs. numerous, grass-like, scarcely stiff, 3–9 in. long in cult. specimens (often 1–2 ft. long and more rigid in wild specimens), about ½in. wide: peduncles usually in 3's, 1-fld.: fls. reddish lilac, very fragrant; perianth-segms. lanceolate, acute, 1–1½ in. long. E. Trop. Afr. B.M. 7962. G.C. III. 34:425. Very little known in cult.

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VELTHEÌMIA (named for the Count of Veltheim, 1741–1801). *Liliàceæ*. Greenhouse and half-hardy tunicate bulbous perennials; spring and summer.

Leaves radical, several, oblong or strap-shaped, rather thick, herbaceous, lower longer than the upper, sheathing the base of the simple leafless scape: fls. showy, pendulous, densely grouped in a terminal raceme or spike; perianth tubular, cylindrical, persistent, lobes 6, very short, tooth-like; stamens 6; ovary sessile or subsessile, oblong, 3-celled: caps. membranous-scarious, the 3 angles strongly dilated and wing-like, loculicidally 3-valved.—Three species, S. Afr. They are easy of cult. and are but little known in Amer.

A. *Lvs. green, 2–3 in. broad.*

viridifòlia, Jacq. Lvs. oblong-lorate, wavy-margined, finally 1 ft. long: scape mottled with purple: raceme very dense, 3–6 in. long, 25–30-fld.: fls. 1¼–1½ in. long, yellow or reddish, with greenish tips. L.B.C. 13:1245. B.M. 501 (as *Aletris capensis*). G.C. III. 49:164. Gn. W. 22:117. G.W. 5, pp. 112, 454.

3908. False hellebore.—Veratrum viride. Showing the handsome foliage of early spring when the leaves are about a foot high.

AA. *Lvs. glaucous, 1½ in. broad.*

glaûca, Jacq. Lvs. oblanceolate-lorate, acute, glaucous: scape less stout: fls. "yellow or bright red," according to Baker. B.M. 1091 (fls. white, dotted red toward the tips); 3456 (fls. reddish purple, dotted yellow above). F. TRACY HUBBARD.†

VELVET BEAN: *Stizolobium.* **V. Tree:** *Gynura aurantiaca.*

VENÍDIUM (name not explained by its author). *Compósitæ*. Annual or perennial herbs, grown for ornament.

Rays female: receptacle honeycombed, mostly nude: involucral scales in several rows, the outer narrower and herbaceous, inner scarious: achenes glabrous, dorsally 3–5-winged or -ridged, the lateral ridges inflexed, the medial straight, narrower; no hairs from the base of the achene: pappus either none or of 4 very minute, unilateral scales.—Eighteen species, S. Afr., 7 of which are annuals. By Hoffmann (Engler & Prantl, Pflanzenfamilien) united with Arctotis.

The following account of *V. calendulaceum* of the gardens as a garden plant is adapted from Gn. 21, page 405. It is a graceful single-flowered composite which flourishes under the ordinary treatment accorded half-hardy annuals, making a compact rounded mass 2 feet high and 3 feet wide. "There is considerable diversity in its seedlings both as regards habit and the size, shape and shading of its blossoms, and careful selection in seed-saving is needful in order to secure the best forms. It is admirably adapted for cutting, as the flowers open and shut as regularly as when on the plant." This species has also been treated as a greenhouse perennial, continuing to bloom until near midwinter. The flower-heads are fully 2 inches across.

decúrrens, Less. Diffuse canescent perennial, 1–2 ft. long: lvs. mostly lyrate, the terminal lobe ovate or roundish, sinuate-lobed or repand, at first cobwebbed, afterward nude and punctate above, white-tomentose beneath; petiole 2–2½ in. long, amply eared at base, the ear decurrent along the st.—The type does not seem to be cult. but the following variety is offered as a half-hardy garden annual with dark-centered sunflower-like golden yellow heads 1–2½ in. across:

Var. **calendulàceum,** Harvey (*V. calendulàceum,* Less.), differs in having the petioles not eared at the base or with only a small ear. R.H. 1857, p. 123. Gn. 21, p. 405. G. 5:345.—Opinions differ as to its merits, and it is variable in quality. Some consider it coarse and weedy. In pots it does well; for spring bloom, sow in Aug. to Oct. in a frame in light soil and prick off into pots; if well grown it is very free-flowering.

WILHELM MILLER.

VENUS' FLY-TRAP: *Dionæa muscipula.* **V. Hair:** *Adiantum Capillus-Veneris.* **V. Looking-Glass:** *Specularia Speculum.* **V. or Venice Sumach:** *Cotinus Coggygria.*

VERÀTRUM (ancient name of hellebore). *Liliàceæ*. FALSE HELLEBORE. Hardy perennial herbs grown in the border.

Rhizome stout: sts. erect, stout, leafy base thickened but not truly bulbous: lvs. usually broad, plicate-veined, contracted to a broad sheath: fls. purplish, greenish, or whitish, numerous in a terminal panicle, polygamous; perianth persistent, broadly campanulate or explanate, segms. connate at the base especially in the female fls.; stamens 6; ovary ovoid, apex very shortly 3-lobed: caps. septicidally splitting into 3 carpels. —About 18 species, Eu., Asia, Russia, and N. Amer.

Veratrums are striking habit plants, of easy culture in moist shady positions. In the open sunlight or in dry ground the foliage is liable to burn and decay prematurely. They may be propagated by division or seeds.

A. *Fls. whitish or greenish.*

B. *Perianth-segms. crisped-dentate.*

álbum, Linn. EUROPEAN WHITE HELLEBORE. A hardy perennial 3–4 ft. high: root short, fleshy: lvs. green, plicate; radical lvs. 1 ft. long, oblong, 5–6 in. wide, firm in texture: panicle 1–2 ft. long, dense: fls. whitish inside, greenish outside; segms. oblong-spatulate, crisped-dentate; pedicels almost none. June, July. Eu., N. Asia.

BB. *Perianth-segms. serrulate or entire.*

víride, Linn. AMERICAN WHITE HELLEBORE. INDIAN POKE. Fig. 3908. A hardy perennial, 2–7 ft. high: root-stock 2–3 in. long: lvs. plicate, acute, the lower oval, about 1 ft. long, the upper gradually smaller: fls. yellowish green; segms. oblong or oblanceolate, ciliate, serrulate; pedicels 1–3 lines long. July. N. Amer.

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B.B. 1:408. B.M. 1096 (as *Helonias viride*). Gn. 62, p. 283.

califórnicum, Durand. St. very stout, 3–7 ft. high: lvs. ovate-acute, the upper ones lanceolate but rarely acuminate: perianth-segms. broader than in *V. viride*, obtuse, whitish with a greener base. Colo. and Wyo. to N. Calif. and Ore. G.C. III. 46:395. Gn. 62, p. 411.—Intro. 1883. The long panicle of whitish, bell-shaped, drooping fls. is followed by ornamental frs. or caps.

AA. *Fls. blackish purple.*

nigrum, Linn. A hardy perennial often 2–4 ft. high, somewhat bulbous at the base: lower lvs. oblong, plicate, 1 ft. long, 6–8 in. wide, narrowed at the base; upper lvs. lanceolate: panicle narrow: fls. blackish purple; segms. oblong, obtuse. June. Eu., Asia. B.M. 963. G.W. 2, p. 99; 14, p. 618. F. TRACY HUBBARD.†

VERBÁSCUM (old Latin name of the mullein used by Pliny). *Scrophulariàceæ.* MULLEIN. Hardy biennial herbs, rarely perennial or subshrubs, more or less tomentose or floccose-lanate, sometimes grown in the garden or border for ornament.

Plants usually erect and tall: lvs. all alternate, usually soft, entire, crenulate, sinuate-dentate or pinnatifid: racemes or spikes terminal, simple or branched: fls. yellow, fuscous, purple or red, rarely white; calyx deeply 5-cleft or parted, rarely shortly 5-toothed; corolla-tube about none, explanate-rotate, lobes 5, broad, slightly unequal; stamens 5: caps. globose, oblong or ovoid, septicidally 2-valved.—About 270 species, natives mostly of the Medit. region, widely intro. in other countries. Prop. by means of cuttings or division, although most of the mulleins usually self-sow freely.

The mulleins are very easily cultivated, adapting themselves to almost any soil except a wet cold one. In America the name mullein calls to mind the common weed, *V. Thapsus*, but this same weed if massed in the wild border is a very showy plant and gives a tall columnar effect which is very pleasing when contrasting with looser, more open-growing plants such as larkspur, wild asters, and goldenrods. Another feature of the mulleins which makes them valuable in border planting is the generally predominating gray-green of the foliage, in fact of the whole plant, which contrasts with the bright or dark green foliage about it. The most serious drawback to the mulleins in general is that most of them are biennial and although they reproduce naturally and freely they hybridize so readily that they rarely reproduce true. However, most of the hybrids are as showy as their parents and as a whole they deserve a place in every border of size. Some of the more showy and satisfactory species are *V. olympicum*, *V. phœniceum*, *V. Chaixii*, *V. nigrum*, *V. phlomoides*, *V. pannosum*, and *V. cupreum*, although many others are almost equally as good. In choosing varieties the question of height should be taken into account, as some species grow much taller than others. Nearly all the species will stand any amount of sun although some of them, as *V. phœniceum*, do better in partial shade as the flowers do not open well in strong sunlight.

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KEY TO THE SPECIES.

A. *Anthers of the lower and longer stamens adnate-decurrent.* (*Section I. Thapsus.*)
B. *Fls. clustered.* (*Subsection 1. Euthapsi.*)
C. *Anthers very short-decurrent: corolla concave at the throat* ..... 1. **Thapsus**
CC. *Anthers longer adnate-decurrent: corolla flattened out.*
D. *The fls. subsessile.*
E. *Cauline lvs. long-decurrent* ... 2. **thapsiforme**
EE. *Cauline lvs. short-decurrent* .. 3. **phlomoides**
DD. *The fls. pedicelled, pedicels about as long as or longer than the calyx.*
E. *Lvs. 1½–2 ft. long* ..... 4. **longifolium**
EE. *Lvs. 6–8 in. long* ..... 5. **crassifolium**
BB. *Fls. solitary or nearly so.*
C. *Plants woolly.* (*Subsection 2. Spectabiles.*)
D. *Corolla yellow* ..... 6. **ovalifolium**
DD. *Corolla bluish or purplish* ..... 7. **Wiedemannianum**
CC. *Plants glabrous or glandular-pilose above.* (*Subsection 3. Blattaria.*)
D. *Pedicels in 2's or 3's* ..... 8. **virgatum**
DD. *Pedicels solitary* ..... 9. **Blattaria**
AA. *Anthers all kidney-shaped and of about equal size.* (*Section II. Lychnitis.*)
B. *Parts of the infl. as well as the rest of the plant woolly.*
C. *Pedicels shorter than the calyx or nearly wanting.*
D. *Infl. simple or few-branched.* (*Subsection 1. Thapsoidea*).
E. *Fls. solitary* ..... 10. **niveum**
EE. *Fls. in clusters.*
F. *Filaments violet-bearded* .... 11. **Boerhaavii**
FF. *Filaments yellowish or white-bearded.*
G. *Base of blade cordate-subauriculate* ..... 12. **glomeratum**
GG. *Base of blade attenuate.* 13. **simplex**
DD. *Infl. many-branched.*
E. *Fls. clustered; calyx deeply 5-parted.* (*Subsection 2. Glomerata.*)
F. *Filaments white-bearded* ... 14. **mucronatum**
FF. *Filaments purple-bearded* ... 15. **sinuatum**
EE *Fls. solitary or in few-fld. clusters; calyx 5-toothed.* (*Subsection 3. Pyramidata.*) 16. **pyramidatum**
CC. *Pedicels as long as or longer than the calyx.* (*Subsection 4. Lychnitidea.*)
D. *Beards of the filaments purple* (*sometimes white in No. 19*).
E. *Infl. simple or nearly so* ..... 17. **nigrum**
EE. *Infl. many-branched.*
F. *Corolla-lobes nearly rotund.* 18 **Chaixii**
FF. *Corolla-lobes obovate* ..... 19. **pyramidale**
DD. *Beards of the filaments white* (*often purple in No. 19*).
E. *Upper surface of lf. glabrous.* 20. **Lychnitis**
EE. *Upper as well as lower surface of lf. tomentose.*
F. *Margins of lvs. crenate* ..... 19. **pyramidale**
FF. *Margins of lvs. entire or nearly so.*
G. *Lvs. oblong or elliptic, broader toward the middle* ..... 21. **pulverulentum**
GG. *Lvs. more or less lanceolate, broader toward the base.*
H. *Calyx-segms. lanceolate* ..... 22. **songaricum**
HH. *Calyx-segms. narrowly linear-lanceolate* .. 23. **olympicum**
BB. *Parts of the infl. glabrous or nearly so, the rest of the plant woolly.*
C. *Corolla glabrous: fls. clustered.* (*Subsection 5. Leiantha.*) ..... 24. **leianthum**

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cc. *Corolla glandular: fls. solitary or in few-fld. clusters.* (*Subsection 6. Blattarioidea.*)
D. *Segms. of calyx linear-lanceolate*.....25. **rubiginosum**
DD. *Segms. of calyx elliptical*.....26. **phœniceum**

Section I. Thapsus.

Subsection 1. Euthapsi.

1. **Thápsus,** Linn. (*V. Blattària*, J. A. Schmidt, not Linn. *V. giganteum*, Willk. *V. Schràderi*, Mey.). Common Mullein. Fig. 3909. Biennial, 2–6 ft. high, densely yellowish tomentose: radical lvs. oblong, crenulate, petioled; cauline lvs. decurrent from lf. to lf.: fls. yellow, fascicles forming spike; calyx tomentose, lobes lanceolate; corolla small, concave. Eu., especially N. and Cent., and Cent. Asia, also naturalized in N. Amer. Gn. 28, p. 148.—A familiar weed in woods and uncultivated fields. Hybridizes very readily with other species. There is also a white form of the species. This plant varies considerably in the color and size of its fls., the denseness of its infl., and probably occurs under several trade names in Eu. A first-year rosette in a pot makes an attractive plant (Fig. 3909).

3909. Rosette of mullein.—Verbascum Thapsus.

2. **thapsifórme,** Schrad. (*V. densiflòrum*, Bertol.). Biennial, about 2–5 ft. high, densely yellowish tomentose: radical lvs. oblong-elliptic or elliptic-lanceolate, crenulate, attenuate to the petiole; cauline lvs. narrowly decurrent from lf. to lf.: fls. in fascicles forming spike, large, yellow; calyx tomentose, segms. lanceolate; corolla rotate, rather flat. Eu. and Cent. Russia. Var. **macrûrum,** Benth. (*V. macrùrum*, Ten.), is white-tomentose and the cauline lvs. are more broadly decurrent. Italy.

3. **phlomoìdes,** Linn. Biennial, 4–6 ft. high, whitish- or yellowish tomentose: radical lvs. crenulate, elliptic or oblong-lanceolate, attenuate to the petiole; cauline lvs. amplexicaul, usually cordate or very shortly decurrent: fls. yellow, in very short fascicles forming a long raceme; calyx tomentose, segms. triangular-lanceolate; filaments white-woolly. S. E. Eu. and Caucasus. Gn. 40, p. 561; 41, p. 555. Var. **álbum,** Hort., has creamy white fls.—The species has become naturalized in E. N. Amer.

4. **longifòlium,** Ten. Biennial, 3–4 ft. high, covered with white or yellowish flocculent tomentum: lvs. numerous, densely superposed; lower 1½–2 ft. long, narrowly ovate or oblong-lanceolate, acuminate, base narrowed to a short petiole; upper sessile, base amplexicaul, all undulate: infl. sessile, 1 ft. long, 3½ in. diam., with innumerable short appressed branches: fls. golden yellow, about 1 in. across; calyx stellate-tomentose, segms. lanceolate. S. Eu. B.M. 7707. Var. **pannòsum,** Hort.(*V. pannòsum*, Vis. and Panc.), is more densely tomentose, the infl. is laxer and more branched and the fls. often larger. G. 31:105. Gn. 62, p. 165. Not a good variety botanically.

5. **crassifòlium,** Hoffm. & Link. Biennial, about 3–4 ft. high, densely yellowish tomentose: lvs. obovate-spatulate, 6–8 in. long, crenulate; cauline long-decurrent: fls. fascicled in a spicate raceme, yellow; corolla flattened; filaments glabrous. Portugal.—Closely allied to and possibly only a variety of *V. thapsiforme*. One of the few species said to thrive well in a light sandy soil.

Subsection 2. Spectabiles.

6. **ovalifòlium,** Don (*V. formòsum*, Fisch.). Biennial, about 2–3 ft. high, gray-tomentose: lvs. large, ovate, petioled, coarsely and rather double-crenate, cordate, petioled, hoary beneath; upper lvs. cordate-clasping: fls. sessile or nearly so, solitary, large, 1½ in. across, bright yellow, in a spike; calyx densely white-tomentose, segms. broad-lanceolate; filaments orange- or purple-woolly. S. Russia. B.M. 1037. B.R. 558.

7. **Wiedemanniànum,** Fisch. & Mey. Biennial, 1–3 ft. high, appressed, arachnoid woolly: st. stout, tall, leafy below: lvs. lanuginose; radical oblong or elliptic, 3–5 in. long, crenate or rather entire, attenuate to the petiole; cauline diminutive, oblong, sessile: fls. solitary, in a simple raceme or slightly branched panicle, large, 1¼ in. across, indigo-blue to purplish lilac; calyx densely glandular-hirsute, segms. lanceolate-linear; filaments purple-bearded. Caucasus. G.C. III. 14:785. Gt. 43, p. 76.

Subsection 3. Blattaria.

8. **virgàtum,** With. (*V. Blattària*, Vell., not Linn. *V. blattarioìdes*, Lam. *V. glàbrum*, Willd. *V. viscìdulum*, Pers.). Biennial, 1½–3½ ft. high, whole plant green, somewhat viscid-hispid or nearly glabrous: lvs. glabrous or glandular-hispid, especially beneath, oblong; lower petioled, dentate or sinuate-pinnatifid; upper sessile, cordate-clasping or shortly decurrent: raceme glandular-hispid; pedicels in 2's or 3's, rarely solitary: fls. yellow, throat violet; filaments violet-woolly. Cosmopolitan.

9. **Blattària,** Linn. Moth Mullein. Biennial, 8 in. to 4 ft., glabrous and green: sts. usually tall: lvs. oblong or oblong-lanceolate, dentate; lower attenuate to the petiole, undivided or sinuate-pinnatifid; upper sessile, cordate-amplexicaul, acute: raceme very long and lax: fls. rather large, yellow, rarely white, borne on solitary pedicels; calyx glandular, segms. linear-lanceolate; corolla-throat violet: caps. globose, longer than the calyx. Eu., N. Asia.—Distinguished from *V. virgatum*, which it resembles, by the solitary pedicels.

Section II. Lychnitis.

Subsection 1. Thapsoidea.

10. **nìveum,** Ten. Biennial, about 2 ft. high, possibly more, white-tomentose: lvs. ovate-oblong, crenate, undulate; lowest petioled, the others sessile, acuminate, rather spoon-like, shortly half-decurrent, the wings cuneate: raceme simple and very dense: fls. yellow, rarely white, solitary, subsessile; calyx-segms. ovate, acute; filaments white-woolly. S. Italy.

11. **Boerhaàvii,** Linn. Biennial, about 2 ft. high, snow-white, tomentose-floccose, finally deciduous: st. reddish, leafy: lvs. crenate-dentate; lower ovate, obtuse, petioled; upper cordate-clasping, acute or acuminate: fls. in a long rigid spike-like raceme, yellow, in subsessile fascicles; calyx tomentose and glandular-viscid; segms. lanceolate; corolla violet-spotted at the throat; filaments violet-bearded. Medit. region.

12. **glomeràtum,** Boiss. Biennial, 4–6 ft. high, densely grayish yellow, ragged, tall and stout: lower lvs. 1 ft. or more long, 3–4 in. broad, subentire, subsessile, oblong-lanceolate, base attenuate; upper lvs. ovate, acuminate from a cordate-subauriculate base: infl. thyrsoid-paniculate: fls. subsessile in 3–4-fld. glomerules, yellow; calyx-segms. lanceolate; corolla strongly tomentose outside; filaments yellowish bearded. Asia Minor.

13. **símplex,** Labill. Perennial, about 2 ft. high, many-stemmed, base shrubby, densely white or yellowish, ragged: st. leafy below then prolonged into a long (6–12 in.) simple, strongly interrupted, rarely

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slightly branched raceme: radical lvs. 1–2 in. long, crenulate, ovate- or oblong-spatulate, very obtuse, long-petioled; cauline lvs. sessile or nearly so, arranged in remote glomerules of 2–5: fls. yellow; calyx white-tomentose, segms. oblong, mucronate; filaments white-bearded. Syria. G.C. III. 36:2.

Subsection 2. GLOMERATA.

14. **mucronàtum,** Lam. Biennial, several feet high, densely white, ragged-tomentose: st. erect, crowded, leafy, large-panicled: lvs. thick; radical oblong, crenate, sometimes somewhat lobed and somewhat petioled; cauline lvs. oblong, rather long-decurrent; uppermost suborbiculate, mucronate: glomerules of fls. globose, forming a long virgate, interrupted raceme: fls. subsessile, white; calyx silky-lanate, segms. broad-lanceolate; filaments white-woolly. Asia Minor and Crete.

15. **sinuàtum,** Linn. Biennial, 2–3 ft. high, more or less densely yellowish or gray-tomentose: radical lvs. oblong-spatulate, subsessile, sinuate-pinnatifid, usually undulate; upper cauline lvs. oblong, acute, entire and short-decurrent: panicle pyramidal; branches elongated, twig-like: fls. yellow, rarely white, in remote glomerules; calyx tomentellous, segms. short-lanceolate; corolla small; filaments purple-woolly. Medit. region and Canary Isls.

Subsection 3. PYRAMIDATA.

16. **pyramidàtum,** Bieb. Biennial, 2–4 ft. high, tomentose: st. stout: lvs. green above, canescent beneath; radical lvs. large, oblong, base long-narrowed, doubly and obtusely lobed or crenate; upper lvs. sessile, ovate, auriculate-cordate, long-acuminate: panicle pyramidal, sometimes 2 ft. long, canescent; branches finally rather lax: fls. yellow, solitary or in pairs; calyx tomentose, segms. oblong or ovate; corolla large; filaments purple-woolly. Caucasus.

Subsection 4. LYCHNITIDEA.

17. **nìgrum,** Linn. (*V. Hinkei*, Friv.). Biennial, 2–3 ft. high: st. tall, angled above: lvs. green above, more or less tomentose beneath; lower long-petioled, ovate or oblong, base cordate; uppermost sessile, base rotundate: infl. a simple or slightly branched elongated raceme: fls. small, yellow, in many-fld., lax fascicles; calyx hirsute, segms. lanceolate-subulate; corolla-throat purple; filaments violet-bearded. Eu. and Asia. Gn. 27, p. 173. Var. **àlbum,** Hort., has white fls. G. 15:159. Gn. 41, p. 551.

18. **Chaìxii,** Vill. Biennial, usually about 3 ft. high, whitish tomentose: st. somewhat angled above: lvs. ovate to oblong, green or tomentose below, crenate; lower 3–6 in. long, petioled, base cuneate, more or less crenate or rather incised; upper lvs. sessile, base rotundate: racemes paniculate, fascicled and laxly several-fld.: fls. yellow; calyx-segms. lanceolate-subulate; corolla-lobes nearly rotund, filaments purple-woolly. S. Eu. Gn. 27, p. 172; 78, p. 435. Var. **àlbum,** Hort., is a white-fld. form.—This species is said to reach a height of 10 ft. and to act like a true perennial in warm soils. **V. orientàle,** Bieb., is considered the same by some authorities; apparently not in cult. The vars. *semilanàtum*, Hort., and *Freynìànum*, Hort., are really hybrids.

19. **pyramidàle,** Host. (*V. speciòsum* × *V. orientàle*). Biennial, 3–4 ft. high, white-pilose: lvs. rugose, crenate, acuminate, radical and lower cauline lvs. oblong, broad, upper smaller, strongly canescent: fls. small, collected in glomerules, yellow; calyx densely tomentose; corolla-lobes obovate, red-brown-maculate at base; filaments white or purplish hairy. Austria.—Neither of the parents are in cult. and it is questionable what the material in the trade under this name really is; possibly it is *V. pyramidatum*.

20. **Lychnìtis,** Linn. Biennial, tomentose: lvs. crenate, green above, slightly hoary or canescent beneath; radical oblong-elliptic, narrowed to the petiole; upper lvs. sessile, lanceolate: infl. paniculate; branches erect-spreading, angled: fls. small, yellow or white; calyx tomentose, segms. lanceolate, acute, tips glabrous; filaments white-woolly. Eu. and Caucasus.

21. **pulverulèntum,** Vill. Biennial, 3–9 ft. high, densely white-floccose-tomentose: lvs. entire or obsoletely crenate; radical lvs. oblong or elliptic, attenuate to a short petiole; upper lvs. ovate or rotundate, clasping: infl. a pyramidal panicle: fls. yellow, in slightly remote fascicles; calyx densely floccose, segms. linear-lanceolate; corolla small; filaments white-woolly. Eu. Gn. 73, p. 422.

22. **songàricum,** Schrenck. Biennial, several feet high, white-tomentose: lower lvs. lanceolate, acute, narrowed to the petiole; cauline sessile, oblong, cordate-auriculate; uppermost subrotund, cuspidate: racemes panicled: fls. in fascicles, yellow; calyx-segms. lanceolate; filaments white-bearded. Soongaria.

23. **olỳmpicum,** Boiss. Biennial, 3–5 ft. or more high, densely white-tomentose: lower lvs. usually 6 in. long, oblong-lanceolate or lanceolate, entire, base attenuate; upper lvs. short-lanceolate, acute: panicles pyramidal, the racemes very long, lax; glomerules many-fld.: fls. rather large, about 1 in. across, bright yellow; calyx very tomentose, segms. long and narrowly linear-lanceolate; filaments white-bearded. Greece. G. 13: 669. Gn. 30, p. 213; 31, p. 125; 38, pp. 55, 66; 41, p. 555; 47, p. 147; 70, p. 91; 78, p. 436. Gng. 1:273. J.H. III. 52:119. Gt. 31:1078.

Subsection 5. LEIANTHA.

24. **leiànthum,** Benth. Biennial, up to 14 ft. high, covered with a dense white felt: basal lvs. very large, sometimes 4 x 2 ft.; cauline lvs. oblong, crenate, rugose, base decurent, lax, whitish tomentose on both surfaces: infl. much branched up to 7 x 3½ ft., laxly many-fld.: fls. bright yellow, ¾in. across; calyx-segms. small, oblong-lanceolate, rather obtuse. Asia Minor. G.C. III. 44:171. Gn. 72, p. 509.

Subsection 6. BLATTARIOIDEA.

25. **rubiginòsum,** Waldst. & Kit. Biennial, about 2–3 ft. high: st. glabrous or pubescent above: lvs. green, pubescent beneath, crenate; lower petioled; upper sessile or cordate-clasping: racemes laxly branched, somewhat paniculate; pedicels in 2's or 3's, rarely solitary, twice or many times as long as the calyx: fls. reddish purple; calyx-segms. linear-lanceolate; filaments purple-woolly. S. E. Eu. and Caucasus.—Boissier Flora Orientalis suggest that this is a hybrid between *V. phœniceum* and *V. nigrum*. Var. **ferrugìneum,** Benth. (*V. ferrugìneum*, Mill.), has a long simple raceme and slightly larger and longer-pedicelled fls. than the type. Horticultural form, possibly a hybrid.

26. **phœnìceum,** Linn. (*V. ferrugìneum*, And.). PURPLE MULLEIN. Biennial, about 5 ft. high: lvs. glabrous above, short-puberulent beneath; radical rosulate, ovate or oblong-rhomboid, attenuate to the short petiole, obtuse, obtusely crenate or repand; cauline lvs. few, sessile, oblong or lanceolate, acute: fls. purple or red, in a simple slender raceme; calyx glandular, obtuse segms. elliptical; corolla glabrous; filaments purple-woolly. S. E. Eu., Caucasus, and Persia. G. 15:158. Gn. 22, p. 377; 27, p. 173; 41, p. 566. A.G. 13:630. L.B.C. 7:637.—The name *phœniceum* was undoubtedly suggested by the Phœnician purple and not by the habitat. One of the parents of nearly all the hybrids having fls. of purple, violet, rose, pink, and lilac shades. The fls. open poorly in sunshine, preferring damp weather, consequently the locality should be one where only the morning and evening sun strike the

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fls. Var. **álbum**, Hort., is a white-fld. form. Gn. 46, p. 519.

V. Caledònia, Hort. (V. hybridum caledonia, Hort.), is a hybrid by some said to have buff fls., by others sulfur-yellow shaded bronze, and by still others rosy drab with a darker center, and by all to be strong-growing and branched.—*V. cùpreum*, Sims (*V. phœniceum* var. cupreum, Benth ex W. Mill. V. ovalifolium × V. phœniceum). Biennial: st. simple: lvs. cordate-ovate, rugose, crenate, lanate beneath: raceme elongated; pedicels rather long, 1-bracted: fls. copper-colored. Garden hybrid. B.M. 1226.—It differs from V. ovalifolium not only in the color of the fls., but also in having pedicelled instead of sessile fls., and 1 subtending bract instead of 3. —*V. Libani*, Hort., is offered in the trade.—*V. newyénse*, Hort. (V. Chaixii × V. phlomoides), is offered in the trade as having erect spikes of large yellow fls. with dark centers.

F. Tracy Hubbard.

VERBÈNA (ancient Latin name of the common European vervain, *V. officinalis*). *Verbenàceæ*. Annual or perennial herbs or subshrubs, which are diffuse or sometimes creeping, some of them common flower-garden plants and sometimes grown in the greenhouse.

Leaves opposite or rarely ternately whorled or alternate, dentate or usually incised or dissected, rarely entire: spikes terminal, sometimes densely imbricated, sometimes elongated, slender and remotely fld., sometimes broadly corymbose or paniculate on an erect st., rarely axillary: fls. small or medium-sized, sessile; calyx tubular, 5-ribbed, 5-toothed; corolla-tube straight or incurved, limb spreading, somewhat 2-lipped, lobes 5, oblong or broad, obtuse or retuse; stamens 4, in pairs; ovary entire or very shortly 4-lobed at apex, 4-celled, cells 1-ovuled: fr. separating into 4 narrow pyrenes or nutlets.—About 80–100 species, chiefly natives in Trop. and extra-Trop. Amer. Some of them are unshowy weedy plants in fields and waste grounds in the U. S. and Canada. For the lemon verbena (*V. citriodora*), see *Lippia citriodora*.

Verbenas rank high among plants grown as garden annuals. Their clusters of showy and often fragrant flowers are borne in constant succession from June till frost. They vary from white through lilac and rose to purple and dark purplish blue, with shades of pink and pale yellow. The clusters are about 2 inches across and contain a dozen or more flowers each ⅝ to ⅞ inch across. The plants are grown with ease in any usual garden soil and condition. For general purposes, the plants should be grown from seeds. The plants are set about 1 foot apart each way, although a strong plant in good soil may spread 3 feet or so in the course of the season. Usually the seeds are started indoors, but if sown in the open as soon as the season is settled and warm, flowering plants should be secured in July or early in August. The verbena of gardens is a semi-trailer, the flower-stems not rising more than about a foot or so. It is sometimes used as a ground-cover under gladioli, lilies, and other tall plants, and in the margins of shrubbery plantations. It also makes an excellent window-box subject.

When special colors or named varieties are desired it is necessary to propagate verbenas by cuttings. To propagate a particularly choice variety by cuttings, shorten back the plants about September 1, keep them well watered, and by the end of the month there will be plenty of quick tender growth suitable for cutting. Put the cuttings in the propagating-house or even in flats with soil in bottom and sand on surface. Place the flats in a coldframe, and keep them moist and shaded until the cuttings are rooted. When rooted, transfer to flats in a cool light house until after New Year's. Then pot them, using 2½-inch pots, and allow a temperature of 50° F., which will soon give plenty of material for additional cuttings. Verbenas increased from cuttings tend to flower early, and those propagated in February or March will require at least one pinching. When planting-out in beds for summer bloom, bend the plant over nearly to the horizontal, so that the new growth will spread along the surface of the soil. These shoots will take root quickly, thereby covering the ground. The old method was to peg the plants down.

In propagating general stock, sow the seed in February and pot into 2-inch pots as soon as the seedlings are up an inch. A temperature of 45° to 50° will answer, but they should have full light. There is no place equal to a mild hotbed for young verbenas. About April 15 plunge the pots in a few inches of soil in a mild hotbed. Lift them now and then and rub off the roots which go through the bottom of the pot, in order to check growth and hasten flowering. Customers want to see them in flower before buying, and most of them wait till the end of May. However, verbenas may be planted out early in May, as a slight frost will not injure them.

The evolution of the garden verbenas has taken place in about seventy-five years. Although the history can be made out with considerable clearness, yet the botanical origin of the present florist's race, as to the species involved and the extent to which they have contributed, is not satisfactorily recorded. It is probable that four species have been more or less fused in the race or group known as *Verbena hybrida*,—*V. chamædryfolia*, *V. phlogiflora*, *V. incisa*, and *V. teucrioides*. These species are shown in Fig. 3910. For an historical account of the development of the garden verbenas, see Cowen, "Cyclopedia of American Horticulture," Vol. IV.

It is impossible satisfactorily to classify the hybrid garden verbenas according to their botanical derivation. They are conveniently classed according to color of flowers into: (1) Selfs, or one-colored varieties; (2) Oculatas, or eyed varieties; and (3) Italians, or striped varieties. As to habit they may be divided into: (1) Standards, those of the ordinary loose, spreading growth; and (2) Compactas, which are much reduced in stature and of more condensed form. Verbenas now in cultivation are shown in Figs. 3910, 3911.

Latin trade names probably mostly or entirely belong with the garden or hybrid race of verbenas, such as *compacta*, *coccinea*, *grandiflora*, *monstrosa*, *cærulea*, *candidissima*, *italica*, *auriculæflora*, *striata*.

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A. *Connective of the upper anthers not appendaged.*

B. *Clusters not panicled. Prototypes of the garden verbenas (V. hybrida, Hort. Fig. 3911).*

C. *Fls. scarlet.*

1. **chamædryfòlia**, Juss. Fig. 3910. Characterized by red fls. in flattish clusters, oblong, coarsely scalloped, nearly sessile lvs. and rather stiff pubescence: sts. slender, forking, creeping at base, hirsute: branches somewhat ascending: lvs. oblong or ovate, base broadly cuneate, contracted into the short petiole, crenate or subincisely serrate, serrations often unequal, strigose above, below hairy, especially on nerves: peduncles elongated, ascending: spikes solitary, capitate: bracts lanceolate-subulate, ciliate: calyx hirsute-canescent, sparingly glandular, more than twice as long as the bracts; corolla crimson, limb irregular.—Occurs in two rather distinct forms: var. **Melíndres**, Hort., has oblong to oblong-lanceolate lvs., which are unequally incised-serrate. This form is less hirsute and is more graceful and vigorous. It was the form first intro. to cult. Var. **melindroides**, Hort., has shorter, broader lvs. and is more hairy. Different forms occur over S. Brazil, Uruguay, Paraguay, and the whole of the Pampas. B.R. 1184. L.B.C. 16:1514. B.M. 3333. P.M. 1:173. B. 3:129.

CC. *Fls. rose or purple.*

D. *Fl.-clusters oval to oblong: lvs. saw-toothed.*

2. **phlogifiòra**, Cham. (*V. Tweedieàna*, Niven). Fig. 3910. Characterized by rosy or purple fls. in oblong or

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oval clusters; resembles No. 1, but has more upright habit, softer pubescence and larger, longer-pointed, distinctly petioled lvs.: sts. ascending: branches rather erect, much subdivided, angled, retrorsely hirsute: lvs. oblong or lanceolate-triangular, acute, base entire, cuneately long-attenuate into the evident petiole, unequally subincised serrate, somewhat venosely rugose, strigose above, below hairy or strigillose pubescent: spikes terminal, pedunculate, many-fld., oval to oblong: bracts short-ovate to subulate-lanceolate: calyx twice as long as bracts, covered with short pubescence interspersed with short capitate glandular hairs. S. Brazil and Uruguay. B.M. 3541. P.M. 4:5. B. 2:60.

DD. *Fl.-clusters flat or convex: lvs. more deeply and sharply cut.*

3. **incisa,** Hook. Fig. 3910. Rosy or purple-fld. species with lvs. more deeply cut than in the two preceding: whole plant hairy-pubescent; sts. ascending; branches erect: lvs. oblong-triangular, base cuneately truncate or subcordately attenuate into the evident petiole, pinnatifid lobed or deeply serrated and incised, upper lvs. sublanceolate, sessile, incisely pinnatifid: spikes terminal, pedunculate, subternate, flat or convex: bracts ovate: calyx 4 times as long as bracts, short-hairy, sprinkled with glandular hairs; corolla-tube glandular-pubescent, thrice as long as calyx; limb large, rose-purple, paler beneath, obovate lobes deeply emarginate. S. Brazil, Paraguay, and N. Argentina. B.M. 3628.

CCC. *Fls. white.*

4. **teucrioides,** Gill. & Hook. Fig. 3910. Characterized by fragrant white fls. in very long clusters: sts. cespitose, rooting at base, ascending, terete, openly and copiously hirsute: lvs. ovate to oblong-triangular, base entire, sessile or nearly so, obtusely serrate, margins revolute, veiny-rugose, glandular-pubescent above, subtomentosely hispidulous on veins below: spikes terminal, solitary, glandular, hairy, lax, 5–9 in. long: bracts subulate-lanceolate, ciliate: calyx nerved, twice as long as bracts; corolla yellowish white or pinkish, long exserted, twisting in age, fragrant. S. Brazil, Uruguay, Argentina, Chile, and Peru. P.M. 5:243. B.M. 3694.

BB. *Clusters panicled.*

5. **vendsa,** Gill. & Hook. Differs from all other cult. kinds by panicled infl. and tuberous roots: herbaceous perennial, 1 ft. high: sts. simple, rhizomatic, creeping at base, ascending, 4-angled, hairy: lvs. rigid, oblong to oblong-lanceolate, the subcuneate base entire and half-clasping, acute at apex, unequally subincisely dentate, the teeth openly acuminate, nerves prominent, hirsute below: spikes in a close terminal panicle, subternate, lateral ones pedunculate, fastigiate and finally cylindrical: bracts subulate, ciliate, often purplish, exceeding the hairy calyx: corolla lilac or bluish purple to nearly sky-blue, very thinly villous without; tubes slender, thrice as long as calyx: fr. 1 line long, copiously fuscous outside, dorsal ridges 5. S. Brazil and Argentina.

3910. Four prototypes of the garden verbenas, drawn from early colored plates. From left to right: V. chamædryfolia, supposed chief parent of the reds; V. phlogiflora and V. incisa, the originals of the rosy and purple colors; and (right) V. teucrioides, a white flower which is probably chiefly, if not wholly, responsible for the fragrance of the hybrid verbenas.

B.M. 3127.—Tubers may be kept indoors over winter, or species prop. by seeds sown in greenhouse in Jan.

AA. *Connective of the upper anthers furnished with a glandular appendage.*

B. *Fls. violet or rosy purple.*

C. *Bracts half as long as calyx: plant a subshrub.*

6. **ténera,** Spreng. (*V. pulchélla,* Sw., not Hort.). Herbaceous perennial: sts. cespitose, decumbent, rooting: branches slender, 4-angled, ascending, sparsely hairy: lvs. decurrent into the short petiole, 3-parted and again pinnatifid into acute, linear, entire, subrevolute divisions, sprinkled with short hairs: spikes terminal pedunculate: calyx elongated, strigose pubescent or hairy, sprinkled at angles with short stipitate patelliform glands, twice as long as bracts; corolla rose-violet; anther appendages barely exserted, claviculate, subrecurved. S. Brazil and LaPlata region. Var. **Maonéttii,** Hort., by some supposed to be a hybrid between *V. tenera* and *V. incisa* and by others to be a form of *V. tenera,* has rosy pink or carmine fls. rayed with white-margined corolla-lobes. Intro. from Italy and some-

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times called Italian verbena. The name is variously spelled. Gn. 73, p. 31.

cc. *Bracts about as long as calyx or a little shorter: plant annual.*

7. **erinoides,** Lam. (*V. multifida*, Ruiz & Pav. *V. pulchélla*, Hort., in part). Moss VERBENA. Annual or perennial: st. strigose hairy or somewhat hirsute, branching, decumbent, rooting; branches ascending: lvs. ovate in outline, cuneate base decurrent into the petiole, deeply 3-parted and the divisions pinnatifid into narrow linear acute lobes, subrevolute on margins,

3911. The common garden verbena.—Sometimes known as V. hybrida. (×1)

strigose especially on nerves: spikes terminal, solitary, pedunculate, soon elongating and relaxing, canescent hairy: bracts lanceolate, acuminate, spreading, one-half as long to as long or longer than the calyx: corolla rather small, shortly exserted, lilac, bearded within; anther appendages exserted, rather short.—Said by Dr. Gillies to be "one of the commonest plants on the Alps of Chile and Mendoza . . . varying extremely in color of flowers, in stature and in degree in which the leaves are cut." In some individuals the fls. are said to be scarlet, in others blue or purple. Forms assignable to this species occur also in the southern states of Brazil. The species is probably a composite one as now recognized. B.R. 1766 (as *V. multifida* var. *contracta*).—Variable species characterized by distinct finely cut foliage and rosy lilac to deep purple fls., but the clusters and individual fls. are too small to make it popular.

bb. *Fls. lilac: plants annual.*

c. *Lvs. twice pinnatifid.*

8. **bipinnatifida,** Nutt. (*V. pulchélla* of some seedsmen. *V. montàna*, Hort., in part). Perennial, prostrate and rooting at base; sts. stout, upright, branched, 6–18 in. high: lvs. rather thick, petioled, 1–2½ in. long, scabrous above, ovate in outline, bipinnately parted or 3-parted into numerous oblong, rather acute lobes 1–3 lines broad: spikes solitary, dense to rather lax, at first capitate, becoming 2–4 in. long in fr.: corolla 5–8 lines long, purple or lilac, limb 4–5 lines broad, lobes emarginate to obcordate; throat of corolla provided with a palisade of short hairs; upper stamens bearing each a small oval to oblong purplish gland. S. D. to Mex., east of the Rockies.—Fls. become bluish purple in drying.

cc. *Lvs. once pinnatifid.*

9. **canadénsis,** Brit. (*Buchnèra canadénsis*, Linn. *V. Aublètia*, Jacq. *V. Aublètia* var. *Drúmmondii*, Lindl. *V. Drúmmondii*, Hort. *V. Lámbertii*, Sims. *V. montàna*, Hort., in part). Fig. 3912. Perennial, pubescent, with rather stiff hairs or glabrate: branches slender and ascending from a sometimes creeping rooting base, 6–18 in. high: lvs. ovate or ovate-oblong in outline, 1–3 in. long, truncate, broadly cuneate or subcordate at base and the petiole more or less margined, incisely lobed and toothed, often deeply 3-cleft: spikes peduncled, dense, short and capitate in early fl., becoming 2–4 in. long in fr.: bracts subulate, mostly shorter than the calyx—these and the calyx densely glandular-pubescent: calyx-teeth unequal, filiform-subulate; corolla 6–10 lines long, from bluish purple or lilac to rosy purple or white, frequently approaching blue in dried specimens; limb ½–¾ in. broad, lobes oblong or obovate, emarginate and more or less revolute near the sinuses, throat provided with palisade of short white hairs; upper anthers bearing each a light brown, oblong gland which is barely exserted. Colo. and Mex. eastward across the continent. B.M. 308; 2200. B.R. 294; 1925.—Reported as producing many garden and spontaneous hybrids. Garden forms are of stouter habit, less inclined to root at base: lvs. larger, dark shiny green above, more conspicuously veiny, clusters and individual fls. larger, and the color variation more striking. Many forms have a rich spicy fragrance quite different from that of the hybrid verbenas. On account of the robust healthy nature of *V. canadensis*, it has been frequently recommended in horticultural literature as desirable for hybridizing with the hybrid verbenas to improve their constitution. The cross would probably be too radical for best results. It is to be regretted that this charming species which is thought well of in Eu. should be neglected in its native country.

V. radicans is listed as an alpine species of trailing habit and with crimson fls., suitable for rock-gardens. The *V. radicans* of botanists (Gill & Hook.) is an Andean species with procumbent rooting sts., glabrous divided lvs. with ultimate segms. very narrow, and lilac-colored fragrant fls. in short head-like spikes.

J. H. COWEN.
L. H. B.†

VERBENA, LEMON: *Lippia.* **V., Sand:** *Abronia.*

VERBESÍNA (probably a meaningless alteration of Verbena). *Compósitæ.* CROWNBEARD. Annual or perennial herbs, or some tropical species shrubby.

Leaves alternate or opposite, often decurrent: heads corymbose or solitary, of yellow or white fls.; rays sometimes wanting, pistillate or neutral: achenes flattened or those of the rays 3-sided, their margins winged or not;

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pappus of 2 (1–3) awns, sometimes with 2 or 3 intermediate scales.—About 50 species, American. About a half dozen hardy perennial verbesinas have slight rank as garden plants, but the competition among yellow-fld. autumn-blooming composites is so great that verbesinas have little chance. They make acceptable wild-garden and back-border subjects.

occidentàlis, Walt. (*V. Siegesbéckia,* Michx. *Phæthùsa occidentàlis,* Brit.). Hardy perennial herb, 4–8 ft. high: lvs. ovate (uppermost oblong-lanceolate), acuminate,

3912. Verbena canadensis; formerly known as V. Aubletia. (×⅓)

serrate, the larger ones 8 in. long, contrasted into a marginal petiole: rays styliferous and usually fertile: awns of pappus not hooked. Dry hillsides, E. U. S.—A robust and rather coarse plant, growing 4–8 ft. high, and suitable only for the wild-gardens and the back row of the hardy border. It is doubtless of the easiest cult. It blooms from Aug. to Oct., and has numerous yellow fls. ½–1 in. across in flattish clusters.

crocàta, Less. A much-branched, hairy perennial with a fleshy 4-winged st.: lvs. opposite, decurrent, irregularly pinnately lobed, the lobes usually ovate and much toothed: fls. in solitary, peduncled heads, not very showy: achenes quite glabrous. Mex.—Offered by Montarioso Nursery at Santa Barbara, otherwise little known. Perhaps not hardy north of Washington.

V. Párpusii, T. S. Brandeg. Dwarf: lvs. in a rosette, elliptic, 4–5 in. long: scapes 8–12 in. long, each bearing a solitary fl.-head 1¾–2 in. across; ray-florets deep golden. Mex.—*V. virgínica,* Linn. (Phæthusa virginica, Brit.). VIRGINIA CROWNBEARD. A hairy-stemmed perennial with winged branches and white corymbose-paniculate heads has been offered. It is a wild-garden subject that would be good to naturalize. E. N. Amer. Gt., 47, p. 132.

N. TAYLOR.†

VERNÒNIA (after Wm. Vernon, an English botanist who traveled in North America). *Compósitæ.* IRONWEED. Perennial herbs or in the tropics shrubs and trees.

Leaves alternate, pinnately veined: fls. usually purple or rose, borne in the following species in terminal cymes: heads not glomerate, several to many exclusively tubular-fid.: involucre of dry or partly herbaceous, much-imbricated bracts: corolla regularly 5-cleft into narrow lobes: achenes 8–10-ribbed, with a blunt apex and a cartilaginous, callous base; pappus double (at least in American species).—About 560 species widely scattered about the world, but is possibly most plentiful in S. Amer. The latest monograph is that by H. A. Gleason in Bull. N. Y. Bot. Gard. 4:144–243, 1906. The following species are native of the U. S., and are hardy perennial herbs of attractive appearance, with rather large heads of purple fls. in terminal clusters in late summer or early fall. Vernonias are of easy cult. in any good, rich border, being easily prop. by division. Very satisfactory groupings can be made with vernonias and native asters and goldenrods.

A. *Heads 50–70-fld.*

crinìta, Raf. (*V. arkansàna,* DC.). St. 8–10 ft. high: lvs. linear-lanceolate, 4–12 in. long, alternate-acuminate, glabrous or somewhat pubescent: peduncles not branched: involucre green, the filiform tips often reddish and the pappus often purplish. Plains, Mo., Kans. to Texas. July–Sept. Var. **álba,** Hort., has white fls.

AA. *Heads 15–40-fld.*

B. *Lvs. narrowly linear.*

C. *Plant about 1 ft. high.*

Líndheimeri, Gray & Engelm. St. excessively leafy up to the infl.: lvs. 1½–3 in. long by 1–2 lines wide, white-tomentose, with revolute margins: fls. in a corymbiform cyme. July–Sept. Rocky hills, W. Texas.

CC. *Plant 2–4 ft. high.*

Léttermanii, Engelm. St. fastigiately and cymosely much branched at the summit: lvs. 2–4 in. long, only 1 line wide, much crowded and very numerous; margins not revolute: fl.-heads numerous, ½in. long, 10–14-fld. July–Sept. Sandy soil, Ark.

BB. *Lvs. not narrowly linear.*

C. *Bracts of involucre tipped with slender awns.*

noveboracénsis, Willd. Fig. 3913. St. 3–6 ft.: lvs. oblong to oblong-lanceolate, 3–9 in. long: heads in an open cyme: involucre commonly brownish or dark purplish: fls. deep purple, rarely white. Usually in moist soil. July–Sept.—The only common species of the E. U. S. and often used in the wild-garden.

CC. *Bracts not awned.*

D. *Plant tomentose.*

Báldwinii, Torr. St. 3–7 ft. high: lvs. oblong to ovate-lanceolate, 4–8 in. long, rather numerous: bracts greenish, acute or acuminate, tips spreading or reflexed: fls. purplish, blooming earlier than most species, in July and Aug. Prairies, eastern Mo. to Texas.

DD. *Plant glabrous.*

E. *Lvs. thin.*

altíssima, Nutt. (*V. máxima,* Small). St. 5–10 ft. high: lvs. veiny, lanceolate or lanceolate-oblong, 4–12 in. long, usually long-acuminate and finely serrate: infl. loosely branched and open, the fls. purple: bracts obtuse or merely mucronate-tipped, closely appressed. July–Sept. W. Pa. to Ill., La., and Fla.

EE. *Lvs. thickish.*

fasciculàta, Michx. St. 2–5 ft. high: lvs. somewhat obscurely veined, linear to oblong-lanceolate, 3–6 in. long: heads numerous and crowded on the branches of the cyme, 20–30-fld.: bracts obtuse or some of the upper mucronate-acute, closely appressed. July–Sept. Ohio and Ky. to the Dakotas and south to Texas. Grows on prairies and in moist soil; variable southward.

3913. Isolated specimen clump of ironweed.—Vernonia noveboracensis.

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V. Arschavaltæ, André. Glabrous shrub, 3–6 ft. high: lvs. sessile, leathery, linear-lanceolate: fl.-heads reddish violet. Uruguay. —*V. gigantèa*, Hort. Robust: fl.-heads in panicles, carmine or violet-rose.

F. W. BARCLAY.
N. TAYLOR.†

VERÓNICA (named in honor of St. Veronica). *Scrophulariàceæ*. SPEEDWELL. Annual and perennial herbs, shrubs, or rarely trees, one group of which, mainly European and American species, are hardy in the North, the other group, New Zealand species, are hardy in California and similar climates and are also somewhat used as greenhouse plants.

Leaves opposite, rarely whorled or rather few; cauline lvs. very rarely alternate; floral lvs. always alternate: fls. disposed in terminal or axillary bracteate racemes, or rarely solitary in the axils of alternate lvs., blue, purple, flesh-colored, or white, never yellow; calyx 4–5-parted, very rarely 3-parted; corolla-tube short, usually very short, limb spreading, 4–5-cleft; stamens 2: caps. compressed or turgid, 2-grooved, loculicidally dehiscent, usually obtuse or emarginate.—About 300 species, mostly natives of the temperate and colder regions, a few in the tropics. Veronica was monographed by Bentham in DC. Prod. 10:458–491 (1846), 158 species being then known. About 200 species are now known, very widely distributed.

All are showy free-flowering plants, used, except the shrubs, as garden perennials or annuals, and are propagated by seeds, the perennials also by division, the shrubs by cuttings in spring or summer. They succeed in any good garden soil in a sunny situation. The lower-growing forms are good rock-plants; the taller are adapted to the herbaceous border. The shrubby forms are greenhouse plants or grown only in warmer parts of the country, particularly California, where they are everblooming, and where they do well along the coast even in exposed places by the sea. The shrubby species are mostly natives of New Zealand. They are well reviewed in The Garden 45, page 506, and 28, page 292. Some of them have enjoyed a considerable popularity in England, where they are generally seen in cool conservatories, but they survive the winters outdoors in the most favored parts of the British Isles. The first hybrid was raised in 1848 by Isaac Anderson-Henry (then Isaac Anderson), a noted hybridizer. This gentleman continued his experiments for several years, using *V. speciosa*, *V. salicifolia*, and *V. elliptica*. His work was continued by others, and most of the hybrid veronicas of today have the parentage above indicated, with the blood of *V. speciosa* generally much in evidence. If a collective name for veronica hybrids is desired, *V. speciosa* var. *hybrida* is the best name for the whole group. Unfortunately all these hybrids are unfit for general cultivation out-of-doors in northern climes, but a hardier race will probably be secured by using *V. Traversii* and its allies, which have been introduced more recently. Some of these are *V. Colensoi*, *V. anomala*, *V. monticola*, and *V. pimeleoides*,—all unknown to the American trade. A third and still hardier group of the New Zealand speedwells is the truly alpine group known as whipcord veronicas. These should be hardy in many northern rockeries. They are unknown in America now. The best of the group is said to be a form of *V. cupressoides*, known to English trade as *V. salicornioides*. Others in cultivation are *V. Hectori*, *V. Armstrongii*, and *V. lycopodioides*. (A. P. Wyman.)

The New Zealand veronicas (Cockayne).

In New Zealand the veronicas comprise a marked feature in the flora, being represented by many shrubby and semi-shrubby kinds. Several of these species are well-known evergreen garden plants in California and parts of Europe. The following comment on the New Zealand veronicas is by L. D. Cockayne, Wellington; and the systematic treatment of these species is also founded on manuscript contributed by him.

Excepting the Tasmanian *V. formosa*, the shrubby species are natives of New Zealand where they occur in all kinds of stations and at all altitudes. In their native land, and in Great Britain and Ireland, they are now widely cultivated, but, unfortunately, none can be considered perfectly hardy in the northern states, though, where the cold of winter does not sink much below 12° F., many of the species should thrive admirably. All can be readily propagated from seeds or cuttings. If the latter are taken from adult plants in the autumn, they will bloom during the succeeding summer, and if bedded out on the rockery are most effective.

The genus in New Zealand contains more than 100 species, while nearly all of these can be subdivided into several distinct varieties. There are also astonishing differences in their growth-forms. Some are trees and others shrubs, which latter are erect or prostrate, compact and ball-like or wide-spreading, densely leafy or

3914. Veronica longifolia var. subsessilis (×¼). No. 6.

the leaves reduced to adpressed scales so that the plant resembles a cypress (the whipcord veronicas). The flowers also differ considerably and may be in small heads, racemes of different length, corymbs, or long branched panicles. The usual color is white, but crimson, lilac, violet, and blue are met with. Usually the leaves are bright green and perhaps glossy, but in some species, and this is a sign of hardiness, they are of a pleasing pale glaucous hue.

The compact shrubby species lend an admirable effect to the garden landscape when massed together on banks, many looking as if trimmed into a ball-like form by the gardener's hand. Most forms tolerate clipping to any extent. Some, especially *V. elliptica*, *V. angustifolia*, and *V. leiophylla*, make excellent evergreen hedges. A small form of the polymorphic *V. buxifolia* can be used as an edging after the manner of the box.

The species are exceedingly difficult to determine and errors abound in garden nomenclature, while unpublished names are frequent. Natural hybrids also occur and this brings in further confusion. Also, there are a number of garden hybrids in cultivation, mostly between *V. speciosa* and its nearer relatives. Much more important for colder countries are the

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hybrids due to crossing the more hardy alpine species. So far as American gardens are concerned the following, not yet introduced or rare in cultivation (some of them not here described), would be desirable novelties: *V. Dieffenbachii, V. gigantea, V. Barkeri, V. Lewisii, V. leiophylla, V. Bollonsii, V. anomala, V. vernicosa, V. monticola, V. Menziesii, V. decumbens, V. tetragona, V. Armstrongii, V. propinqua, V. loganioides, V. Lavaudiana*, and *V. Raoulii*. Those desiring more information about the shrubby veronicas should consult Cheeseman's "Manual of the New Zealand Flora," Wellington, 1906, and the subsequent volumes of the "Transactions of the New Zealand Institute."

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KEY TO THE SECTIONS.

A. *Infl. terminal.* (*See also No. 32.*)
B. *Lvs. bearing fl.-shoots alternate* (*annuals*).
Section IV. OMPHALOSPORA. Species 19, 20.
BB. *Lvs. all opposite.*
C. *Corolla-tube lacking or very short.*
Section III. VERONICASTRUM. Species 9–18.
CC. *Corolla-tube long.*
D. *Caps. ovate or oblong.*
Section I. PÆDEROTA. Species 1, 2.
DD. *Caps. suborbicular.*
Section II. PSEUDOLYSIMACHIA. Species 3–8.
AA. *Infl. axillary.*
B. *Plants shrubs, or trees, rarely herbs: caps. turgid.* Section VII. HEBE. Species 41–60.
BB. *Plants herbaceous* (*base decumbent and often becoming woody*): *caps. laterally compressed.*
C. *Caps. only slightly compressed.*
Section V. BECCABUNGA. Species 21.
CC. *Caps. strongly compressed and transversely broader.*
Section VI. CHAMÆDRYS. Species 22–40.

Section I. PÆDEROTÆ.

A. *Lower lvs. orbicular*..... 1. **Bonarota**
AA. *Lower lvs. lanceolate*..... 2. **virginica**

1. Bonaròta, Linn. (*V. chamædryfòlia*, Wettst. *Pæderòta Bonaròta*, Linn. *P. chamædryfòlia*, Brign.). Perennial, pilose: sts. 4–6 in. high: lower lvs. orbiculate, scarcely 1 in. long; upper lvs. ovate or lanceolate, serrate or incised: spike globose or oblong, compact, 1–1¾ in. long: fls. blue, about ½in. across; calyx-segms. linear-subulate. Italian Alps and Tyrol.

2. virgínica, Linn. (*Leptándra virgínica*, Nutt. *V. verticillàta*, Hort.). CULVER'S ROOT. Erect, simple, somewhat pubescent herb 2–6 ft. tall: lvs. in whorls of 4–6, lanceolate, 2–4 in. long, smooth above, pubescent below, acutely serrate, short-petioled: racemes terminal, erect, long, dense: fls. many, white or pale blue, short-pedicelled: caps. longer than broad, pointed, twice exceeding the calyx. Aug.–Sept. Eastern states. Gn. 79, p. 259.—Free-growing herb. Likes rich soil and much sun. While stiff and coarse, it is bold and stately. Var. **álba,** Hort. (*V. verticillàta* var. *virgínica álba*, Hort.), is offered in the trade as a form growing 4 ft. high, with erect spikes of white fls. Var. **japónica,** Makino (*V. japónica*, Steud. *V. verticillàta* var. *japónica*, Hort.), has pedicelled blue or white fls., the pedicel equaling or exceeding the calyx. Var. **sibírica,** Makino (*V. sibírica*, Linn. *V. verticillàta* var. *sibírica*, Hort.), has sessile or subsessile blue or white fls.; pedicels always shorter than the calyx.

Section II. PSEUDOLYSIMACHIA.

A. *Foliage and st. white-pubescent or white-woolly.*
B. *Base of lvs. cordate*..... 4. **Bachofenii**
BB. *Base of lvs. attenuate*..... 8. **incana**
AA. *Foliage and st. nearly glabrous.*
B. *Lower lvs. pinnatisect*..... 3. **pinnata**
BB. *Lower lvs. merely serrate or crenate.*
C. *Racemes panicled*..... 5. **spuria**
CC. *Racemes solitary or few.*
D. *Lvs. lanceolate*..... 6. **longifolia**
DD. *Lvs. ovate-oblong*..... 7. **spicata**

3. pinnàta, Linn. Strong, upright plant 2–3 ft. high, glabrous or pubescent: lvs. sparse or somewhat clustered, finely cut, the lower pinnate with spreading segms., the upper pinnatifid, thickish, shining, smooth: racemes slender, many-fld., elongated: fls. blue. June, July. Open mountain lands, Russia.

4. Bachofènii, Heuff. Perennial, white-pubescent: sts. several, ascending or erect, 1–2 ft. high: lvs. opposite, petioled, 1–2 x 1 in., cordate-oblong, acute, coarsely serrate: racemes terminal, 1–12, opposite, elongate: fls. blue; calyx-lobes 4, linear, subequal; corolla-tube inflated, lobes broad-lanceolate: caps. small, obcordate, slightly compressed, about equaling the calyx. Hungary.

5. spùria, Linn. (*V. paniculàta*, Linn. *V. augustifòlia*, Fisch., not Bernh. *V. incìsa*, Soland. *V. amethýstina*, Willd.). BASTARD SPEEDWELL. Upright, slender, densely pubescent species 2 ft. high: lvs. mostly opposite or ternate, 1 in. long, linear, acute, serrate-crenate toward the apex, entire below, smooth, narrowed at the base, thickish: racemes numerous, panicled, long, densely many-fld.: fls. blue, pedicelled: caps. nearly round, thick, exceeding the sepals. May, June. G.W. 7, p. 437. Woods, S. E. Eu. and S. Russian Asia.—Becomes weedy late in the season. Var. **élegans,** Voss ex Wyman (*V. élegans*, DC. *V. paniculàta* var. *élegans*, Benth.), has the lvs. pubescent on both surfaces and is more branched than the type. Belgium. Variants of this variety are known in horticulture as *V. élegans* var. *cárnea*, Hort., a form growing 1 ft. high and having spikes of rich pink fls. and the variegated form as *V. élegans cárnea variegàta*.

6. longifòlia, Linn. (*V. marítima*, Linn. *V. hýbrida*, Georgi, not Linn. *V. persicifòlia*, Schott. *V. bracteàta*, Opiz, not Willd.). Strong, leafy, upright, densely growing species 2½ ft. high, with usually a smooth st.: lvs. lanceolate or oblong-acuminate, sharply serrate, lower

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opposite, upper more or less verticillate, pubescent below, very acute, 2½–4 in. long: racemes long, erect, spiciform, dense: fls. lilac, numerous: caps. longer than broad, notched, a little exceeding the linear sepals or sometimes exceeded by them. Becomes black in drying. July–Sept. Wet fields, Cent. and E. Eu. and N. Asia.—Much cult. and hybridized. Has several varieties. A fine border plant and the most common species, growing and flowering freely in any good soil. Var. **álba**, Hort. (*V. maritima* var. *álba*, Hort.), grows 1–1½ ft. high: fls. white. Var. **glaûca**, Hort., has glaucous blue foliage: fls. rich purple. Var. **rósea**, Hort. (*V. rósea*, Hort. *V. hýbrida rósea*, Hort. *V. maritima* var. *rósea*, Hort.), a probable variety with pink fls., 2 ft. high and much branched. Hardy in Mass. Prop. by division and cuttings. Var. **subséssilis**, Miq. (*V. subséssilis*, Hort.). Fig. 3914. More erect, compact and robust than the type, 2–3 ft. high, growing in clumps with numerous side branches and of a good habit: lvs. 2–4 in. long, according to the richness of the soil: spikes longer and fls. larger than of the type and of an intense lustrous blue. Aug.–Oct. Japan. B.M. 6407. R.H. 1881:270. G.C. II. 16:789. J.H. III. 59:253. A good border plant and considered the best speedwell; thrives in deep rich soil in an open position. Var. **villósa**, Hort. (*V. villósa*, Schrad. *V. crenulàta*, Hoffm.). A Siberian form with narrower lvs. than the type and large blue fls. Lvs. serrate or doubly notched or incised.

7. **spicàta**, Linn. (*V. crassifólia*, Wierzb. *V. hýbrida*, Linn.). Ascending or erect, slender sts. 2–4 ft. high, growing from a shortly creeping, almost woody rootstock: lvs. lanceolate, lance-oblong or the lower ovate, opposite or verticillate, crenate, downy, 1½–2 in. long, thick: racemes long, upright, densely many-fld.: fls. pedicelled, clear blue or sometimes pale pink; stamens very long, purple: caps. longer than broad, notched, thick, exceeding the broad hairy sepals. June–Aug. Hilly pastures, Eu. and N. Asia. Gn. 68, p. 55; 78, p. 157. J.H. III. 47:15.—Thrives in an open soil away from shade. Regarded as one of the better border speedwells. Var. **álba**, Hort. (*V. crassifólia* var. *álba*, Hort.), is said to grow 6–18 in. high and have white fls. Var. **corymbósa**, Hort., is offered in the trade as a form growing 1 ft. high: fls. pale blue. Var. **nàna**, Hort., is offered as a form 6–9 in. high: fls. blue. Var. **rósea**, Hort., grows 15–18 in. high: fls. purplish pink, showy. July and early autumn. Var. **supérba**, Hort., is offered in the trade as growing 2 ft. high and having long spikes of violet fls. Var. **variegàta**, Hort., is offered as a form growing 1½ ft. high, with variegated foliage and blue fls.

8. **incàna**, Linn. (*V. cándida*, Hort. *V. neglécta*, Vahl). Strong, upright or ascending, white-woolly plant 12–18 in. high, with many sterile matted branches and fewer fertile erect branches: lvs. opposite, acute, lower oblong, upper lanceolate, 1–3 in. long, white-tomentose: racemes erect, solitary to several, 3–6 in. long: fls. many, blue, short-pedicelled: caps. longer than broad, thick, exceeding the woolly calyx. July–Sept. Fields and mountain regions. N. Asia, and S. W. Eu.—Resembles *V. spicata* in habit. Has a good appearance both in and out of bloom; useful in the rockery, border, or geometrical garden. Var. **candidíssima**, Hort., has lvs. larger and not so hoary as the type: fls. pale blue. Var. **glaûca**, Hort., is offered as a form with silvery foliage and deep blue fls.

Section III. Veronicastrum.

A. *Duration annual: floral lvs. usually about like the lower cauline lvs. (Subsection 4. Annuæ.)*
  B. *Cauline lvs. sessile*.....17. **syriaca**
  BB. *Cauline lvs. petioled*.....18. **glauca**
AA. *Duration perennial, base usually somewhat woody: floral lvs. usually much smaller than the lower cauline lvs.*
  B. *Habit erect or ascending: raceme usually somewhat elongated. (Subsection 3. Alpinæ.)*
    C. *Plants 2–6 in. high.*
      D. *Fls. blue or violet*.....14. **alpina**
      DD. *Fls. rose or white*.....16. **repens**
    CC. *Plants ½–4 ft. high (seldom less than 9 or 10 in.).*
      D. *Lvs. 1–3 in. or more long*.....13. **gentianoides**
      DD. *Lvs. ¼–½in. long*.....15. **serpyllifolia**
  BB. *Habit diffuse, low and much branched: raceme usually much shortened.*
    C. *Infl. capitate, several-fld. (Subsection 1. Diffusæ.)*
      D. *Blades linear-spatulate*.....10. **cæspitosa**
      DD. *Blades ovate, orbicular or oblong-spatulate.*
        E. *Surface of lvs. glabrous*..... 9. **Nummularia**
        EE. *Surface of lvs. white-tomentose*.....11. **bombycina**
    CC. *Infl. a very short (in fr. elongated) raceme, few-fld. (Subsection 2. Fruticulosæ.)*.....12. **fruticulosa**

Subsection 1. Diffusæ.

9. **Nummulària**, Gouan. Perennial: sts. slender, creeping, becoming somewhat woody, diffusely branched: lowest lvs. scale-like, the others clustered, ovate-orbicular, obtuse, entire, about 2 lines long, rather thick, glabrous: racemes somewhat capitate, pubescent: fls. blue or pink; corolla with the lowest segms. much larger than the others: caps. small, broad, rather glabrous. Pyrenees.

10. **cæspitósa**, Boiss. Perennial, diffuse, cespitose: sts. 1–3 in. high, densely foliate: lvs. rather thick, about ⅛in. long, clustered, linear-spatulate, obtuse, entire, margin revolute: raceme subsessile, 1–4-fld.: fls. large, rose; calyx lanate, segms. oblong-linear: caps. glabrous, obcordate, transversely broader. Greece, Asia Minor, and Syria.

11. **bombycina**, Boiss. & Kotschy. Perennial, low, cespitose, forming cushions, appressed white-silky: lvs. very small, about 2 lines long, sessile, ovate or oblong-spatulate: fls. 1–5, terminal, reddish; calyx-teeth oblong, obtuse; corolla more than twice as long as calyx: caps. small, orbicular, tomentose. July. Syria.—In the trade abroad this species is described as having pale lavender fls.

Subsection 2. Fruticulosæ.

12. **fruticulósa**, Linn. (*V. saxátilis*, Scop.). Perennial or shrubby: sts. diffusely branched, 2–6 in. high, woody at base: lvs. ¼–½in. long, oblong or obovate, entire or subcrenate: raceme lax, short, few-fld., pubescent: fls. blue or flesh-colored: caps. ovate. July. Mountains of Eu. and Greenland. There is a white-fld. form horticulturally known as *V. saxátilis álba* and also a form known in the trade as *V. saxátilis Grièvei*.—Possibly not all material known as *V. saxatilis* belongs here.

Subsection 3. Alpinæ.

13. **gentianoídes**, Vahl (*V. glàber*, Hort.). Erect, slender, tufted species 6–24 in. high, from creeping roots: lvs. obovate or oblong, some lanceolate or linear, thickish, entire or small crenate, smooth, 1–3 in. long; root-lvs. more or less in rosettes; upper lvs. bract-like, smaller and narrower: raceme elongated, leafy, many-fld., hairy: fls. pale blue, with darker streaks, on long pedicels: caps. nearly round, slightly notched, exceeding the calyx. Wet alpine fields, S. E. Eu. B.M. 1002.—A hardy species in any soil or location, shade-enduring though not necessarily shade-loving, blooming early. Prop. by division. Forms a mat and makes a good ground-cover for bare spots in midsummer; also a valuable border plant. One of the earliest. Var. **álba**, Hort., is a white-fld. form. Var. **fóliis variegàtis**, Hort.,

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see var. *variegata*. Var. **pállida,** Hort., is offered in the trade as a variety with pale porcelain-blue fls. Var. **pallidifldra,** Hort., is a trade name, perhaps the same as var. *pallida*. Var. **stenophýlla,** Hort., is a narrow-lvd. form. Var. **variegàta,** Hort., is offered in the trade as having lvs. variegated with creamy white. G.M. 54:575.

14. **alpìna,** Linn. A slender delicate plant growing from a creeping stock, branching at the base, becoming ascending or upright, the fl.-st. often solitary, 2–6 in. high: lvs. opposite, occasionally alternate, subsessile, elliptic or oblong, entire or dentate, about ½–1 in. long, of varying size, the lowest small, orbicular: raceme short, spiciform, dense: fls. small, blue or violet: caps. ¼in. long, oblong, longer than broad, hairy, exceeding the calyx. Mountains of Eu., Cent. and N. Asia, and alpine and arctic regions in Amer. B.M. 2975.—Adapted to the rock-garden. It blackens when dried.

15. **serpyllifólia,** Linn. (*V. alpéstris*, Hort.). St. Paul's Speedwell. Slender, ascending, nearly smooth plant, growing irregularly in clumps 2–4 ft. high, the base prostrate and rooting: lvs. ovate or oblong, crenate, ¼–½in. long, smooth, variable: racemes loose, with conspicuous bracts: fls. pedicelled, whitish or pale blue with deeper stripes: caps. wider than long, obtusely notched, exceeding or equal to the sepals. May–July. Roadsides and fields, Asia, Eu., N. Afr., N. and S. Amer.

16. **rèpens,** DC. Prostrate, slender, compact plant growing in dense masses: lvs. ¼–½in. long, ovate, slightly crenate, shining green and moss-like: racemes slender, few-fld.: fls. rose or nearly white, with a trace of blue: caps. broader than long, deeply notched, exceeding the sepals. May. Corsica.—Hardy in Mass. and intro. in Calif. Allied to *V. serpyllifolia* but dwarfer and more prostrate. Grows in the sun. Will cover the ground where grass does not grow, forming a sod in a short time; prefers moist corners but thrives on a moderately dry soil. Var. **álba,** Hort., is a white-fld. form.

Subsection 4. Annuæ.

17. **syrìaca,** Roem. & Schult. (*V. pedunculàta*, Labill., not Vahl). Ascending, diffusely branched pubescent annual, 6–12 in. high: lvs. ovate or ovate-lanceolate, incised or dentate, smooth; lower petiolate, upper subsessile, ½in. long: raceme terminal, slender, 4–6 in. long: fls. blue, with thread-like pedicels ½in. long: caps. broader than long, notched two-thirds of its length, exceeding the sepals. June. S. W. Asia. R.H. 1897, p. 311. F.S. 12:1259. Var. **flòre-álbo,** Hort., is a white-fld. form.

18. **glaùca,** Sibth. & Smith. Annual, suberect, branched; branches opposite, pubescent: lvs. ½–¾in. long, short-petioled, broadly ovate, obtuse, crenate-dentate; floral lvs. bract-like, 2–3-lobed: fls. ¾in. across, bright blue, throat white; calyx pubescent, segms. unequal, in pairs, elliptical: caps. suborbicular, retusely truncate. Greece. B.M. 7759.

Section IV. Omphalospora.

A. *Calyx-segms. ovate-lanceolate*.....19. **Tournefortii**
AA. *Calyx-segms. oblong-elliptic*.....20. **filiformis**

Subsection Agrestes.

19. **Tournefórtii,** C. C. Gmel. (*V. Búxbaumii*, Tenore). Prostrate annual, with elongated slender pubescent sts., the lower branching and often rooting: lvs. ovate, subcordate, coarsely crenate-serrate, pubescent, shortly petioled, ¾in. long, the lower opposite, the upper alternate and similar: racemes axillary: fls. small, blue, scattering, on long pedicels, of long duration: caps. broader than long, very widely notched, exceeded by the sepals. April–Sept. Fields, Cent. and S. Eu., Asia and naturalized in N. Amer. F. 1846, p. 112.

20. **filifórmis,** Smith. Annual or perennial, cespitose, dwarf, slightly papillose-pubescent: branches numerous, filiform, elongated, prostrate and rooting: lvs. small, ovate or orbiculate, obtuse, subcrenate, subcordate, somewhat petioled: fls. on filiform axillary pedicels, blue; calyx-segms. elliptic: caps. ciliate, orbicular-obcordate, acute angled, 2-lobed to the middle. Asia Minor. G. 37:99.

Section V. Beccabunga.

21. **Michaùxii,** Lam. Perennial, 4–5 ft. tall, everywhere pubescent: sts. erect, or ascending from rooting bases: lvs. ovate, crenate-dentate, lower and those of the sterile branches petioled, the others clasping: racemes few, rather dense, from the upper axils: fls. pale blue (drying reddish); calyx-segms. oblong, acute: caps. ovate-orbicular, turgid and glandular. Persia.

Section VI. Chamædrys.

A. *Calyx 5-parted.* (*See also No. 40.*) *The species of this group are closely allied and often hard to distinguish.* (*Subsection 1. Pentasepalæ.*)
B. *Lvs. bipinnatifid.*
C. *Base of caps. rotundate*.....27. **filifolia**
CC. *Base of caps. cuneate*.....26. **multifida**
BB. *Lvs. at most lobed, pinnatisect or even pinnatifid.*
C. *Caps. cuneate at base.*
D. *Blade pinnatifid*.....26. **multifida**
DD. *Blade at most incised-dentate*...22. **orientalis**
CC. *Caps. rotundate at base.*
D. *The lvs. often pinnatifid, when not so narrowly elongate-lanceolate*.....25. **austriaca**
DD. *The lvs. not lobed or pinnatifid, ovate to broadly lanceolate.*
E. *Margin of blade sharply serrate*.....23. **latifolia**
EE. *Margin of blade crenate or bluntly dentate*.....24. **Teucrium**
AA. *Calyx 4-parted* (*occasionally 5-parted in No. 40*).
B. *Racemes few-fld.: pedicels twice to many times longer than the calyx.* (*Subsection 5. Petræ.*)
C. *Fls. solitary*.....40. **canescens**
CC. *Fls. racemose.*
D. *Color of fls. white.*
E. *Lvs. ¼–½in. long, serrate*...38. **Lyallii**
EE. *Lvs. ⅛–¼in. long, 1–2 teeth on each side*.....39. **Bidwillii**
DD. *Color of fls. blue.*
E. *Sts. crisply pubescent: caps. glandular-hirsute*.....36. **petræa**
EE. *Sts. glabrous or minutely white-puberulent: caps. glabrous.*
F. *Calyx-segms. broadly lanceolate*.....35. **Baumgartenii**
FF. *Calyx-segms. elliptic oblong*.....37. **telephiifolia**
BB. *Racemes many-fld.: pedicels shorter or only slightly longer than the calyx.*
C. *Infl. strict, almost spike-like.* (*Subsection 2. Strictifloræ.*)
D. *The racemes alternate*.....30. **Allionii**
DD. *The racemes opposite.*
E. *Cauline lvs. obovate-spatulate, rather narrow, often pinnatifid, ½–¾in. long*.....28. **pectinata**
EE. *Cauline lvs. elliptic-oblong, rather broad, never pinnatifid, usually about 1 in. or more long*.....29. **officinalis**
CC. *Infl. lax and spreading.*
D. *Caps. longer than broad.* (*Subsection 3. Multifloræ.*).....31. **Chamædrys**
DD. *Caps. broader than long.* (*Subsection 4. Scutellatæ.*)
E. *Raceme solitary* (*said to be terminal*).....32. **pirolæformis**
EE. *Racemes several.*
F. *Lvs. broadly ovate*.....33. **montana**
FF. *Lvs. linear-lanceolate*.....34. **scutellata**

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Subsection 1. PENTASEPALÆ.

22. **orientàlis,** Mill. Perennial, shortly and crisply pubescent, rarely glabrate: sts. from woody rhizomes, decumbent or prostrate: lvs. sessile, short, lower cuneate-oblong or lanceolate, dentate-incised, rarely entire; upper usually narrower, lanceolate: racemes 2–4, from the upper axils, secund: fls. flesh-colored or pale blue; calyx-segms. 4 or 5, linear-lanceolate, very unequal: caps. glandular-pubescent, obcordate or truncate. July. Asia Minor and Persia. L.B.C. 5:419. Var. **tenuifòlia,** Boiss. (*V. taùrica,* Willd.), has narrowly linear lvs., with the margins sometimes somewhat revolute, entire, rarely acutely few-toothed. S. Armenia and Persia. L.B.C. 10:911.

23. **latifòlia,** Linn. (*V. urticæfòlia,* Linn.). Perennial, sparsely and crisply hirsute: sts. erect: lvs. sessile, ovate, sharply serrate, base often cordate; upper long-acuminate: racemes opposite, laxly paniculate: fls. light blue or reddish; calyx-segms. minute, lanceolate, rather acute: caps. orbicular, base rotundate. Eu.—Horticultural material under this name is apt to be a broad-lvd. form of *V. Teucrium.*

24. **Teùcrium,** Linn. (*V. dentàta,* F. W. Schmidt. *V. nítida,* Hort., ex Poir., not Ehrh.). Perennial, pubescent: sts. numerous, ascending, up to 20 in. high: lvs. ovate to linear-lanceolate, nearly entire, crenate to even bluntly dentate-incised, mostly sessile: racemes opposite, elongated: fls. large, blue, rarely rose or white; calyx-segms. oblong-linear to lanceolate: caps. obovate, base rotundate. Cent. and S. Eu. and Cent. Asia.—Variable. Var. **latifòlia,** Hort. (*V. latifòlia,* Hort., not Linn.), has broader lvs. Range of the type. Var. **prostràta,** Hort. (var. *dùbia,* Hort. *V. prostràta,* Linn.), has a more prostrate habit, only the tips of the sts. upright. Minor forms of this variety are known in the trade as *V. prostràta* var. *dìlba,* Hort., with white fls.; *V. prostràta* var. *pygmæa,* Hort., is a small form. G.W. 8, p. 2. *V. prostràta* var. *satureiæfòlia,* Hort. (*V. satureiæfòlia,* Poit. & Turp.), has light blue fls. B.M. 3683. *V. rupéstris,* Hort., is quite possibly referable to var. *prostrata.*

25. **austrìaca,** Linn. (*V. multífida,* Jacq., not Linn. *V. orientàlis,* Willd., not Mill. *V. prénja,* G. Beck). Perennial, 1–2 ft. high, pubescent: sts. erect, rarely ascending: lvs. sessile, ovate in outline, pinnatisect, segms. oblong with their base narrowed or linear, entire or incised: racemes 2–4, from the upper axils, elongated, many-fld.: fls. large, blue; calyx-teeth 5, rarely 4, linear, strongly unequal: caps. hirsute, obovate-obcordate. S. E. Eu. and Asia Minor. Var. **angustifòlia,** Benth. (*V. angustifòlia,* Bernh.), is a form with linear-subulate lf.-segms. Caucasus region.—Material offered in the trade as *V. angustifolia* should also be compared with *V. spuria* and *V. scutellata.*

26. **multífida,** Linn. Perennial, shortly and crisply pubescent: sts. decumbent and indurated at base or diffuse: lvs. sessile, pinnatisect in linear, entire or dentate segms.: racemes 2–4, axillary: fls. flesh-colored or pale blue; calyx-segms. strongly unequal: caps. glabrous or short-glandular, transversely broader. June, July. Asia and Asia Minor. B.M. 1679.—Probably not common in cult. and some at least of the material so named is probably *V. austriaca.*

27. **filifòlia,** Lipsky. Sts. several, ascending or erect, 6–12 in. high, crisply pubescent: lvs. sessile, bipinnatifid, divisions long, slender almost filiform: racemes 4–8, opposite, lax-fld.: fls. white, blue-veined, large; calyx-lobes 4, almost equal, nearly linear, acute: caps. shorter than the calyx, strongly flattened, obcordate, transversely broader. Caucasus.—Near *V. multifida.*

Subsection 2. STRICTIFLORÆ.

28. **pectinàta,** Linn. Prostrate, white-pubescent, hairy, spreading plant rooting at the nodes, the ascending branches producing single elongated racemes: lvs. obovate or spatulate, sometimes pinnatifid, crenate, narrow at the base, sessile, pubescent, ½in. long: racemes elongated, many-fld.: lower bracts like lvs.: fls. deep blue with a white center: caps. large, longer than broad, notched, pubescent, thick, exceeding the sepals. May, June. Dry, shady hills. Asia Minor.—Suitable to dry spots in a rock-garden. Grows in almost any soil and position. Var. **ròsea,** Hort., has numerous small spikes of rose fls.

29. **officinàlis,** Linn. (*V. Allìonii,* F. W. Schmidt, not Vill.). COMMON SPEEDWELL. FLUELLEN. GROUNDHELE. Prostrate, leafy native with a pubescent st. rooting at the nodes, slender, 6–18 in. long: lvs. elliptic, oblong or broadly oblong, ½–1 in. and more long, hairy, serrate at base, evergreen, retaining color where most exposed: racemes slender, densely many-fld.: fls. pale blue, rarely pink, sessile: caps. broader than long, wedge-shaped, broadly notched, hairy, exceeding the hairy sepals. May–July. Forests and mountains of Eu. and N. Amer.—Grows under trees and in shade where no grass will grow, covering the ground with a permanent sod. Spreads rapidly and is easily grown. Prop. by cuttings.

30. **Allìonii,** Vill. Perennial, glabrous or slightly minutely puberulent: st. prostrate, rooting at the base: lvs. very short-petioled, obovate-elliptic or oblong, obtusely serrulate, base usually cuneate: raceme densely spicate; pedicels very short: fls. violet; calyx-segms. 4, lanceolate-linear, rather acute; corolla-lobes lanceolate: caps. obcordate, acute, puberulent. S. Eu.

Subsection 3. MULTIFLORÆ.

31. **Chamædrys,** Linn. (*V. pedunculàta,* Vahl. *V. pulchélla,* Salisb.). GERMANDER SPEEDWELL. ANGEL'S EYES. BIRD'S EYES. Slender, compact, pubescent species 12–18 in. high, densely ascending from a creeping base: lvs. broadly ovate, sometimes narrower, subsessile, crenate or incised, rounded or cordate at base, hairy, thick, 1½ in. long: racemes 3–6 in. long: fls. large, blue, long-pedicelled: caps. longer than broad, widely notched, exceeded by the sepals. May, June. Woods and roadsides, N. and Cent. Eu., Caucasus, Syria, and Canaries. Adventive in this country.—A good border plant.

Subsection 4. SCUTELLATÆ.

32. **pirolæfórmis,** Franch. Perennial: sts. short, pilose below: lvs. nearly all clustered, petiolate, very broadly ovate, obovate or spatulate, crenate: raceme terminal, solitary, laxly many-fld.: fls. rose or pale violet; calyx-lobes glandular, ovate-oblong, obtuse: caps. rhomboid, broader than long. China.

33. **montàna,** Linn. MOUNTAIN SPEEDWELL. Slender, trailing, hairy plant, 12–18 in. long, rooting from the st.: lvs. ovate, petioled, coarsely crenate, hairy, sparse: racemes slender, few-fld.: fls. whitish, striped with purple-blue, on long pedicels: caps. large, broader than long, slightly notched, exceeding the hairy sepals. May, June. Moist woods, Temp. Eu.

34. **scutellàta,** Linn. (*V. angustifòlia,* S. F. Gray, not Bernh.). Perennial, 6–18 in. high, weak, glabrous or rarely puberulent: sts. slender: lvs. sessile, linear-lanceolate, acute, remotely and minutely denticulate: racemes filiform, flexuous, few-fld.: fls. whitish, bluish or flesh-color; calyx-segms. oblong: caps. much wider than long, plano-compressed, 2-lobed. N. temperate regions.—Material offered in the trade as *V. angustifolia* should also be compared with *V. austriaca* and *V. spuria.*

Subsection 5. PETRÆÆ.

35. **Baumgàrtenii,** Roem. & Schult. (*V. petræa,* Baumg., not Stev.). Perennial, 3–5 in. high, possibly more, glabrous or minutely white-puberulent: sts.

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slender, ascending: lowest lvs. minute; middle 6 lines long, ovate or oblong, somewhat dentate; upper lanceolate, narrowed at base: fls. blue; calyx-segms. broadly lanceolate: caps. emarginate, glabrous. S. Hungary.—The material offered in the trade as *V. petræa* may belong here.

36. **petræa,** Stev. Perennial, cespitose, 4–5 in. high, minutely and crisply pubescent: sts. dwarf, diffuse and ascending: lvs. 6–10 lines long, oblong or elliptic from a cuneate, subsessile base, few-toothed; upper lvs. sometimes entire: racemes axillary, solitary; peduncles rather long: fls. large and blue; calyx-segms. broad-oblong: caps. glandular-hirsute, 2-lobed, transversely broader, base rotund, apex retuse. Caucasus.—The material offered in the trade under this name may be *V. Baumgartenii.*

37. **telephiifòlia,** Vahl. Perennial, creeping or tufted, glabrous, glaucous: branches diffuse, filiform but rather hard and fragile, rooting: lvs. fleshy, bluish green, small, 2–3 lines long, obovate-spatulate or oblong, short-petioled: peduncles axillary, solitary, ending in a short

3915. Veronica Andersonii (×⅓). No. 41.

raceme: fls. blue; calyx-segms. elliptic-oblong: caps. glabrous, 2-lobed, transversely broader, base rotundate. Armenia.

38. **Lyallii,** Hook. f. Perennial: sts. slender, prostrate and rooting, 3–18 in. long, diffusely branched; branches ferete, usually pubescent: lvs. short-petioled, ¼–½in. long, broadly ovate, almost orbicular or oblong-ovate, obtuse or subacute, with 2–3 coarse blunt serratures to a side, thick and coriaceous: racemes several, few or many-fld., near the ends of the branches, sometimes lateral: fls. white with pink veins, ⅓in. across; calyx deeply 4-parted, segms. ovate-oblong, ciliolate: caps. broadly obovate-oblong, turgid, 2-lobed. New Zeal.

39. **Bidwillii,** Hook. Perennial, about 3 in. high: sts. slender, prostrate and rooting, much branched, woody at base, 3–12 in. long; branches creeping, often matted, glabrous or pubescent: lvs. short-petioled or almost sessile, minute not more than ¼in. long, broadly oblong or ovate with 1 or 2 deep notches on each side or entire, coriaceous: peduncles axillary, slender, erect, 3–9 in. high, few- or many-fld.: fls. white, calyx-segms. 4, ovate or oblong, obtuse: caps. broadly oblong. June. New Zeal.

40. **canescens,** T. Kirk. Perennial, small creeping and rooting herb with intricately branched sts. 1–4 in. long, often forming broad matted patches, hispid with grayish white hairs: lvs. minute, short-petioled or nearly sessile, obtuse, entire, both surfaces hispid: fls. solitary and axillary, pale blue (rich blue according to the trade); calyx 4–5-parted, segms. linear-oblong; corolla 4-lobed, lobes oblong: caps. small, broadly oblong, slightly compressed. Late-flowering. New Zeal.

Section VII. Hebe.

A. *Lvs. strictly scale-like, connate and appressed. (See also No. 54 which has somewhat scale-like but recurved spreading lvs.)*
  B. *The lvs. densely imbricated* ..... 59. **Hectori**
  BB. *The lvs. in distant pairs* ..... 60. **cupressoides**
AA. *Lvs. not strictly scale-like and appressed. (No. 54 has somewhat scale-like but recurved spreading lvs.)*
  B. *Margin of lvs. coarsely serrate*..... 58. **Hulkeana**
  BB. *Margin of lvs. entire or minutely incised.*
    C. *Blades more than 2 in. long (occasionally less in No. 42).*
      D. *Apex of lvs. obtuse*..... 41. **speciosa**
      DD. *Apex of lvs. acute or acutish.*
        E. *Caps. thrice length of calyx*... 44. **macrocarpa**
        EE. *Caps. twice or less length of calyx.*
          F. *Fls. ⅓in. across*..... 45. **amabilis**
          FF. *Fls. ⅛–⅙in. across.*
            G. *Calyx-segms. narrow-oblong: fls. ⅛–⅙in. diam*..... 42. **macroura**
            GG. *Calyx-segms. lanceolate or ovate-lanceolate to ovate-oblong: fls. ⅙in. diam*..... 43. **salicifolia**
    CC. *Blades rarely more than 1 in. long.*
      D. *Shrubs erect, more than 2 ft. high.*
        E. *Racemes corymbosely branched.*
          F. *Calyx 3- rarely 4-parted*... 46. **diosmifolia**
          FF. *Calyx 5-parted*..... 47. **formosa**
        EE. *Racemes simple or even spicate.*
          F. *Lvs. glaucous*..... 52. **glaucophylla**
          FF. *Lvs. green.*
            G. *The lvs. glossy: fls. in a spike*..... 51. **buxifolia**
            GG. *The lvs. not glossy.*
              H. *Apex of lvs. obtuse, red-margined*..... 49. **Balfouriana**
              HH. *Apex of lvs. acute.*
                I. *Fls. ½in. diam*..... 48. **elliptica**
                II. *Fls. ¼in. diam*..... 50. **Traversii**
      DD. *Shrubs decumbent, less than 1 ft. high.*
        E. *Lvs. glaucous.*
          F. *Color of fls. white*..... 56. **pinguifolia**
          FF. *Color of fls. blue*..... 57. **glaucocærulea**
        EE. *Lvs. green.*
          F. *The blades flat*..... 53. **chathamica**
          FF. *The blades recurved.*
            G. *Blades broadly obovate oblong*..... 54. **epacridea**
            GG. *Blades ovate-lanceolate*.. 55. **loganioides**

41. **speciòsa,** R. Cunn. Stout half-hardy shrub, 2–5 ft. high, with stout, spreading leafy branches and crimson-purple fls.: lvs. 2–4 in. long, obovate or obovate-oblong, subsessile, dark green, thick, smooth, glossy, entire, rounded at apex: racemes axillary and opposite near tips of branches, stout, dense-fld.: fls. large, ⅓in. diam., purple-crimson: caps. more than twice as long as the calyx. Summer. New Zeal. B.M. 4057. F.S. 1:19. R.H. 1844:60. H.U. 6, p. 349. Var. **corymbifera,** Hort., is offered in the trade as growing 2 ft. high with rosy fls. Var. **rùbra,** Hort., is offered in the trade. Var. **variegàta,** Hort., is offered as a form growing 6 ft. high with large lvs. variegated with creamy white: fls. light blue. Probably really the variegated form of *V. Andersonii.* Intro. into S. Calif.—**V. imperiàlis,** Hort. (*V. speciòsa* var. *imperiàlis,* Boncharlat), seems to be merely a garden name for the true species. F.S. 22:

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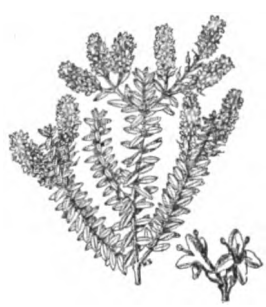
2317. *V. speciosa* hybridizes freely and there are several garden hybrids of which the best known is **V. Andersonii**, Lindl. & Paxt. (*V. salicifòlia* × *V. speciòsa*. *V. speciòsa* var. *Andersonii*, Hort. *V. Hendersonii*, Hort.), Fig. 3915, is grown in the greenhouse and is also used as a bedding plant. It grows 18 in. high: lvs. oblong, sessile, entire, thickish: racemes axillary: fls. bluish violet. F.S. 7:658. J.F. 1:103. G.W. 5, p. 20. Var. **variegàta**, Hort., has the foliage variegated with creamy white. G.L. 18:77. Gn. W. 23:829.

42. **macroùra**, Hook. f. Shrub, 1–5 ft. high, much branched, glabrous: lvs. sessile or nearly so, 1–3 in., usually more than 2 in. long, obovate-oblong to obovate-lanceolate or linear-oblong, acute, hardly coriaceous, glabrous or nearly so: racemes 2–4 in. long, longer than the lvs., very densely many-fld.: fls. small, white or pale bluish white; calyx deeply 4-parted, segms. narrow-oblong, finely pubescent, ciliolate: caps. densely crowded, usually pendulous, small, ovate, compressed. New Zeal. G. 37:307.

43. **salicifòlia**, Forst. f. A collective species containing many distinct varieties. The most common form is a moderately hardy much-branched shrub attaining at times a height of 10 ft.: lvs. lanceolate, 2–6 in. long, acute, entire or slightly toothed near apex, rather thin, pale green, glabrous: racemes slender, many-fld., 3–10 in. long: fls. small, numerous, frequently tinged lilac, sweet-scented: caps. almost twice as long as calyx. Midsummer. New Zeal. B.R. 32:2. Gn. 26, p. 107; 28, p. 293; 34, p. 349. G. 37:308. G.M. 52:258. Gt. 57, p. 189. Var. **Kirkii**, Cheesem. (*V. Kirkii*, J. B. Armstg.). Shrub, 6–12 ft. high; branches stout, dark brown: lvs. smaller, ¾–1½ in. long, oblong or oblong lanceolate, leathery: racemes 4–8 in. long: fls. white, ¼in. across: caps. broadly ovate, acute, hoary-pubescent. New Zeal. **V. gigantèa**, Cockayne, confined to the Chatham Isls., a tree 40 ft. high, is closely related to *V. salicifolia* but is less hardy. **V. rotundàta**, T. Kirk, another allied species, has much broader lvs. and handsome violet-purple fls. There is a fine variegated form of *V. salicifolia* only recently brought into cult. in New Zeal. *V. salicifolia* readily hybridizes with its allies and various hybrids exist but there is no uniformity in their names. **V. cárnea**, J. B. Armstg., with rose-colored fls. has probably the above species as a parent.



3916. Veronica Traversii. (×⅙)

44. **macrocárpa**, Vahl. A half-hardy species with many forms allied closely to *V. salicifolia* but readily distinguished by the generally narrower, thicker, smoother, darker green lvs., the larger white fls. and the much larger caps., thrice as long as the calyx. Late spring. Frequently in poor clay soil. New Zeal. Gn. 78, p. 7.—**V. latisèpala**, T. Kirk, is a handsome plant differing from the above in its deep violet fls., broad calyx-lobes and secund caps.

45. **amábilis**, Cheesem. Tall shrub related to *V. macrocarpa* but differing in its broader, shorter lvs., laxer racemes and acute calyx-segms. Summer. Near seashore mixed with other shrubs. New Zeal. Var. **blánda**, Cheesem., has shorter lvs. and denser, shorter racemes than the type.

46. **diosmifòlia**, R. Cunn. Shrub, usually 2–5 ft. high, but reaching a height of 15 ft.; branches glabrous or puberulous: lvs. short-petioled, ½–1 in. long, linear-oblong or oblong-lanceolate to elliptic-oblong, acute, entire or minutely incised, coriaceous, dark green above, paler beneath: racemes about 1 in. long, corymbosely branched: fls. white or pale lavender-blue, about ¼in. across; calyx usually 3-parted, rarely 4-parted; corolla 4-lobed: caps. ovoid, turgid. New Zeal. B.M. 7539. Gn. 43, p. 519.

47. **formòsa**, R. Br. Evergreen corymbosely branched shrub, 2–4 ft. high, practically glabrous: lvs. rather crowded, oval-oblong or lanceolate, entire or very rarely obscurely toothed, thick: fls. pale lilac, in short racemes in the upper axils; calyx deeply 5-parted: caps. oblong, acute or obtuse, turgid. July. Tasmania. B.M. 4512. J.F. 1:3.

48. **elliptica**, Forst. f. (*V. decussàta*, Ait.). Half-hardy, much-branched shrub, or even small tree, 5–20 ft. high. There are several distinct varieties; the most common in cult. is about 8 ft. high: lvs. petiolate, elliptic-oblong, ½–1 in. long, apiculate, truncate at base, pale green, rather thick, margins edged with white pubescence, midrib prominent beneath: racemes near tips of branches, short, 1–1½ in. long, laxly 4–12-fld.: fls. large, blue for a brief period, then white, sweet-scented: caps. twice as long as calyx. Late summer. Seacoast on rock or on ground mixed with other shrubs. Subantarctic S. Amer., Lord Auckland and Campbell Isls. and New Zeal. B.M. 242. J.H. III. 52:38.—**V. Lèwisii**, J. B. Armstg., a desirable half-hardy, late-blooming species is related to the above and may be a hybrid. It has larger lvs., dense-fld. racemes 2–2½ in. long and very large white fls.

49. **Balfouriàna**, Hook. f. Erect, glabrous shrub, 3 ft. high: lvs. subsessile, ⅓–¾in. long, elliptic-ovate, subacute or obtuse, margins red-brown: racemes 2–3 in. long, many-fld.: fls. pale violet-blue, calyx-segms. acute: caps. one-third longer than calyx-segms. or less. B.M. 7556.—Raised in the Royal Botanic Garden, Edinburgh, from seed sent from New Zeal. but it has not been found growing wild as yet, nor is it cult. in New Zeal.

50. **Tráversii**, Hook. f. Fig. 3916. Shrub of dense habit forming a globose mass of leafy, slender sts. 3–4 ft. diam.: lvs. ½–1 in. long, elliptic-oblong to linear-oblong, green, leathery, acute: racemes near tips of branches, 1–3 in. long, generally tapering: fls. white, calyx-segms. broadly ovate or oblong: caps. twice length of calyx. Midsummer. New Zeal. B.M. 6390. Gn. 32, p. 217; 66, p. 391. G.C. III. 53:172. G. 10:375. G.L. 25:139. G.M. 45:84; 53:630. G.W. 12, p. 161.—**V. monticola**, J. F. Armstg., includes a number of distinct plants much resembling forms of the above, but their lvs. are frequently obtuse and racemes much shorter. Gn. 43, p. 522. **V. lèvis**, Benth., is similar to *V. monticola* but it differs in its corymbosely-branched infl. **V. subalpina**, Cockayne, has softer, brighter green lvs., shorter racemes and corolla-tube. It also blooms earlier than *V. Traversii*.

51. **buxifòlia**, Benth. Under this name are included many most distinct plants, but all possess green, glossy, acute, thick, petiolate lvs., truncate at the base and keeled beneath, which in one form are golden variegated when young, sessile fls. in spikes ¼–1 in. long and lf.-like bracts as long as or longer than the calyx. Var. **odòra**, T. Kirk (var. *pàtens*, Cheesem.), is perfectly globular in form. Var. **prostràta**, Cockayne, is quite prostrate with rooting branches.—Another form, not yet named, is erect, 2–3 ft. high, and sparingly branched. Late summer. New Zeal. **V. anómala**, J. B. Armstg., distinguished from *V. buxifolia* var. *odora* by its sometimes 3-lobed corolla and its narrower lvs. with purplish tips is nevertheless a most distinct and handsome plant. B.M. 7360.

52. **glaucophýlla**, Cockayne (*V. Colénsoi* var. *glaùca*, Hort.). Closely related to *V. Traversii* but at once distinguished by the small, narrow, not keeled, glaucous lvs., slender tapering racemes of white fls., short corolla-tube hairy within and pubescent ovary. Summer. Dry montane and subalpine stations, New Zeal.

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—There are several forms of this striking fairly hardy shrub quite distinct for garden purposes, one of which is known as *V. Colénsoi* var. *glaùca nàna*, Hort. The species is unrelated to *V. Colensoi*, Hook. f., a plant not yet in cult., which has the fls. in corymbs (B.M. 7296).

53. **châthamica,** Buch. A rather tender polymorphic species, the forms of which are distinguished by the trailing habit, flexible branches, elliptic or elliptic-oblong, rather fleshy, pale green, often more or less pubescent lvs. and short, dense, obtuse racemes of violet fls. Late summer. Chatham Isls. G.C. III. 26:354.

54. **epacrídea,** Hook. f. Prostrate, almost hardy shrub of straggling habit: lvs. closely quadrifariously imbricated, opposite pairs united at base, spreading, recurved, ⅛–¼in. long, broadly obovate-oblong, leathery, concave, glabrous, keeled, rounded or subacute at apex: fls. small, white, in dense terminal ovoid heads. Early summer. Mountains, New Zeal. **V. Haàstii,** Hook. f., is closely related to the above but is a larger plant with the lvs. more fleshy and not recurved or keeled. Both are admirable rock-garden plants of a most distinct appearance.

55. **loganioìdes,** J. B. Armstg. Dwarf shrub, 6–14 in. high: sts. woody, decumbent at base, erect above; branches grayish white-pubescent or almost villous: lvs. decussate, sessile, ⅛–⅙in. long, ovate-lanceolate, acute, entire or with 1 or 2 small teeth, dull green, keeled, leathery: racemes forming a small corymb-like head: fls. ¼in. across, white or white with pink veins; calyx deeply 4-parted, segms. ovate-oblong, ciliolate: caps. elliptical-oblong, didymous, turgid. New Zeal. B.M. 7404.—A species of doubtful systematic position, by some placed in section Hebe, by others in what corresponds to section Chamædrys.

56. **pinguifòlia,** Hook. f. (*V. carnósula*, Hort., not Hook. f.). Branches stout, more or less decumbent, ringed with lf.-scars: lvs. imbricating to erect-patent, sessile, narrow-oblong to almost orbicular, ¼–½in. long, glabrous, usually thick, glaucous, generally margined red: spikes crowded near tips of branches, short, stout, dense-fld.: fls. white, ovary pubescent. Summer. Mountains, to 7,000 ft., New Zeal. B.M. 6587.—A fairly hardy polymorphic species containing many most distinct plants admirably suited for rockeries. The forms with larger almost orbicular lvs. are generally termed *V. carnosula* in gardens, but this species, distinguished by its glabrous ovary and acute caps., is probably not in cult. **V. amplexicaùlis,** J. F. Armstg., is an extremely striking allied plant readily distinguished by its far-spreading branches and cordate, semi-amplexicaul lvs. nearly 1 in. long. B.M. 7370. **V. decúmbens,** J. B. Armstg., is of similar habit to *V. pinguifolia* but the lvs. are green, though similarly margined red.

57. **glaùco-cærùlea,** J. C. Armstg. Suberect, fairly hardy shrub, about 1 ft. high: lvs. elliptic, acute, ½in. long, rather thick, intensely glaucous both surfaces, not keeled, margined red: spikes few-fld., rachis strongly pubescent: fls. ¼in. diam., bluish lilac. Midsummer. Dry ground, New Zeal. **V. pimeleoìdes,** Hook. f., is somewhat similar to the above but is more slender, the lvs. narrower and paler, the spikes longer, the rachis much less hairy and the fls. pale lilac. Var. **minor,** Hook. f., is only 1–4 in. high and its fls. are darker and bluer.

58. **Hulkeàna,** F. v. M. Extremely showy, moderately hardy, lilac-fld. species readily distinguished by its shining, coarsely serrate, ovate lvs., 1–2 in. long, and terminal panicles slender, erect, laxly branched, 1–3 ft. high: lvs. in distant pairs, 1–2 in. long, ovate to oblong, obtuse or acute, coarsely serrate, dark green, glossy, rather fleshy: panicle 6–12 in. long by 2–6 in. broad: fls. very numerous, small, sessile, pale soft lilac: caps. small, oblong, twice length of calyx. Rock-faces from the coast-line to 3,000 ft., New Zeal. B.M. 5484. G.C. III. 38:242; 48:444. Gn. 64, p. 115; 77, p. 134. G.M. 47:389; 55:195. R.H. 1906:40. **V. Fairfièldii,** Hook. f., is said to be a hybrid between the above and *V. Lavaudiana*. It is a smaller, stouter plant with smaller lvs., 1 in. long, the margins crenate-dentate and reddish, and the panicle is shorter and broader. B.M. 7323. Gn.W. 5:709 (as *V. fairfieldiensis*). **V. Lavaudiàna,** Raoul, is a handsome shrub 6–9 in. high with broadly obovate or obovate-spatulate lvs., their margins crenate-serrate and margined with red and short spikes arranged in a many-fld. corymb 2 in. diam.: fls. pink in the bud but finally white. B.M. 7210. G.C. III. 9:784.

59. **Héctori,** Hook. f. Stout fairly hardy shrub 6–30 in. high: st. terete, closely marked by old lf.-scars: lvs. densely imbricating, opposite pairs united to middle forming a ring surrounding the branch, broadly orbicular-oblong, ⅒–⅛in. long, obtuse, smooth, shining, puberulous on margin: fls. crowded at tips of branches, forming small, ovate, terminal heads, small, white. Mountains 3,000–6,000 ft., New Zeal., chiefly in the southwest.—Other allied whipcord veronicas are: **V. tetragòna,** Hook., branches obtusely 4-angled, lvs. obtuse, keeled; **V. lycopodioìdes,** Hook. f., branches acutely 4-angled, lvs. narrowed into a blunt point; **V. Armstrongii,** Kirk, branches flabellate, terete, lvs. subacute, fls. pale lilac; **V. salicornioìdes,** Hook. f., branches terete, lvs. united to much above middle, subtruncate, fls. white. **V. propínqua,** Cheesem. (*V. cupressoìdes* var. *varidbilis*, N. E. Br.), was for many years cult. in gardens under the name of *V. salicornioides* but it is semi-decumbent with slender branches about ⅒in. diam. and minute lvs.

60. **cupressoìdes,** Hook. f. Quite distinct from any other of the whipcord species: a shrub of globose form, 4–6 ft. high: branches numerous, very slender, ⅒in. diam., green, clothed with decussate cypress-like scale-like lvs. in distant pairs, much shorter than the internodes and about ⅒in. long: fls. in small terminal heads, small, lilac: caps. obovoid. Summer. Mountains, 2,000–3,500 ft., New Zeal. B.M. 7348. G.C. III. 3:20, 21; 9:38.

V. amàna, Hort., not Bieb., is described as growing 1 ft. high, flowering early: fls. rosy, in neat spikes. The true V. amœna is apparently not in cult.—*V. angustifòlia* var. *ròsea*, Hort., is offered in the trade as shrubby with fls. bright rose in spikes; not determinable botanically as the specific name angustifolia has been used for several different forms.—*V. bachofénsis*, Hort., is offered in the trade as growing 4 ft. high: fls. dark blue in long slender spikes; possibly the same as V. Bachofenii.—*V. Bachofèri*, Hort., is offered as growing 1 ft. high, of close habit with lavender-blue fls.; possibly the same as V. Bachofenii.—*V. circæoìdes*, Don, is offered in the trade, but is not now included in any of the Swiss botanies. The material passing under this name in the trade may be described as follows: Low, trailing perennial, growing in a dense mass: lvs. lanceolate, crenate toward the apex, small, dark green, numerous: racemes many, 6 in. high: fls. small, dark blue. May, June. Considered one of the best. Valuable as a ground-cover, as a rock-plant, or at the front of an herbaceous border.—*V. calestinum*, Hort., is offered in the trade as very dwarf and spreading, with pale blue fls. Var. *corymbòsa*, Hort. ex Don, is a nomen nudum, but material growing less than 9 in. high, with dense glomerate heads of dark blue fls. is offered in the trade under this name.—*V. edinénsis*=V. Hectori×V. pimelioides.—*V. elegantissima*, Hort., is a trade name.—*V. Fórrestii*, Diels. Perennial, 6–15 in. high: sts. decumbent, creeping, branched and stoloniferous at base: lvs. petioled, narrowly ovate or oblong, ⅓–¾in. long, glabrous, paler and often purplish beneath: racemes terminal or axillary: fls. reddish; sepals oblong or lanceolate-oblong, glandular-puberulent; corolla pilose at throat: caps. obliquely rhomboid. Mountains of W. Yunnan, China.—*V. Girdwoòdii*, Hort., is a trade name.—*V. Guthrieàna*, Hort., is a garden hybrid, said to grow 9 in. high: fls. blue.—*V. herbàcea*, Hort., is offered in the trade as having narrow foliage and starry blue fls.—*V. Koenitzeri*, Hort., is a trade name.—*V. Lindsayi*, Hort., is offered in the trade as having large trusses of pink fls.—*V. meldénsis*, Hort., is a trade name.—*V. myrtifòlia*=V. Balfouriana×V. salicifolia.—*V. Prínglei*, Hort., is offered in the trade as having loose tufts of pale blue fls.—*V. rupéstris*, Hort., is probably V. Teucrium var. prostrata. The name rupestris has been used for various forms; that of Salisbury applies to V. fruticulosa, that of Tardent to a plant from S. Russia, the description of which is not available.—*V. rupéstris* of the trade has axillary, many-fld. racemes. It is a low plant with woody horisontal st. and erect flowering branches 4 or 5 in. high with strict racemes of purplish fls. borne in June and a 4-parted calyx. The caps. is obcordate. This plant has been offered by Rochester nurserymen ever since 1894 and was cult. at Harvard Botanic Garden as far back as 1883. Lvs. narrowly oblong, entire or serrate, ½–1 in. long: calyx-segms. strongly unequal: pedicels longer than calyx: st. pubescent: lvs. sparsely ciliate, short-petioled. Gn. 78, p. 161. Var. *álba*, Hort., has white fls. Var. *pállida*,

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Hort., is offered as a pretty trailing species with masses of lilac-blue fls.—*V. umbilicàta spinòsa*, Hort., is a trade name.—*V. utriculàta*, Hort., is a trade name.—*V. Veitchii*, Hort., is a horticultural name. G.M. 54:801.—*V. verbenàcea*, Hort., is unknown botanically, but has been offered by Rochester nurserymen since 1894 as a form with lvs. short-petioled, narrowly elliptic, serrate in the upper half: racemes lateral: fls. blue.—*V. serbenifòlia fòliis variegàtis*, Hort., is a trade name.—*V. Wàldsteinii*, Hort., is offered in the trade as having spikes of blue fls. appearing in very late summer.—*V. Whittallii*, Hort., is offered in the trade as having dense hillocks of dark green foliage and spikes of pale blue fls. F. TRACY HUBBARD.†

VERSCHAFFÉLTIA (Ambroise Verschaffelt, 1825–1886, distinguished Belgian horticulturist; founded L'Illustration Horticole at Ghent in 1854 and introduced many choice plants, particularly palms and other foliage plants). *Palmàceæ*, tribe *Arèceæ*. A tall palm, spinose throughout or at length spineless.

Trunks slender, ringed, arising from above-ground roots: lvs. terminal, recurved; blade oblong or cuneate-obovate, bifid, plicate-nerved, usually laciniate nearly to the rachis; segms. incised; midrib and nerves strong, scaly; petiole half-cylindrical; sheath long, scaly, deeply split: spadix 3–6 ft. long, paniculately branched, long-peduncled, recurved, scaly, its rachis long, and branches and branchlets spreading, slender: spathes 2 or 3, long, sheathing, the lower persistent, the upper deciduous: fls. very small: fr. globose, smooth, 1 in. long.—A genus of only 1 species from the Seychelles. Cult. as in Latania.

spléndida, H. Wendl. Caudex 80 ft. high, 6–12 in. diam., very spiny when young, with many aërial roots: lvs. 5–8 ft. long; petiole 6–12 in. long, pale green; sheath 2½–3½ ft. long, white-granular; blade cuneate-obovate, bright green, 4–7 ft. long, 3–5 ft. wide, bifid, deeply incised on the edges. I.H. 12:430; 43, p. 31. F.R. 2:483. R.H. 1869, p. 148. A.G. 22:649.

V. melanochætes, H. Wendl.=Roscheria.

WILHELM MILLER.

VERVAIN: *Verbena*.

VESICÀRIA (Latin, *bladder*, referring to the shape of the pods). *Cruciferæ*. Branched annual or perennial herbs, treated as annuals in the garden: lvs. entire, sinuate or pinnatifid: racemes without bracts: fls. large, rarely small, yellow or purple, variable in form; sepals similar at base or the lateral somewhat saccate: silique globose or inflated, 1–2-celled, many-seeded, valves swollen.—About 20 species, widely distributed. The annual species are prop. by seeds, the perennial by division.

sinuàta, Poir. Lvs. softly tomentose, oblong-lanceolate, narrowed toward the base, sinuate-dentate or subentire. Spain.—According to DeCandolle the petals finally become whitish. Both seeds and plants of *V. sinuata* are offered by American dealers, but the plant is not generally known. DeCandolle says it is an annual or biennial, while Koch says it is perennial or subshrubby. In the American trade it is considered an early-flowering yellow annual, about 1 ft. high, blooming in May and June. F. TRACY HUBBARD.†

VETCH: *Vicia*. **V., Crown**: *Coronilla*. **V., Milk**: *Astragalus*.

VETIVÈRIA (*Vetiver*, the Tamil vernacular name). *Gramíneæ*. Aromatic perennials with long panicles of numerous slender racemes: spikelets awnless, in pairs, one sessile and perfect, the other pedicelled and staminate, the sessile spikelet bearing minute spines.—Species 1, with 1 or 2 varieties. **V. zizanioides**, Nash (*Andropògon squarròsus*, of authors, not Linn. *A. muricàtus*, Retz. *V. arundinàcea*, Griseb.). Fig. 3917. E. Indies, escaped from cult. in the American tropics and in the S. U. S. The rhizome is very aromatic. This is the Khas Khas or Khus Khus grass of India, the vitivert used in perfumery and the *Radix Anatheri* or *R. Vetiveriæ* of the apothecaries. It has been used in medicines and perfumes from prehistoric times. In India the plant is used to make screens, called "Vetsaries," which, when kept wet and placed in a current of air, cools and perfumes the atmosphere. The rhizome when laid away among them is said to keep clothing free from moths. For history of this grass, see Kew Bull. Misc. Inform. No. 8, 1906. A. S. HITCHCOCK.

VIBÚRNUM (the ancient Latin name). *Caprifoliàceæ*. Ornamental woody plants grown for their attractive flowers, fruits, and foliage.

Deciduous or sometimes evergreen shrubs, rarely small trees, with opposite stipulate or exstipulate lvs.: fls. small, in terminal paniculate or mostly umbel-like cymes; calyx with 5 minute teeth; corolla rotate or campanulate, rarely tubular; stamens 5; ovary usually 1-loculed: fr. a drupe with a 1-seeded, usually compressed stone. In several species the marginal fls. of the cymes are sterile and radiate; such are *V. macrocephalum*, *V. tomentosum*, *V. Opulus*, *V. americanum*, *V. Sargentii*, and *V. alnifolium*, and of the 3 first-named garden forms are known with all fls. sterile and enlarged.—About 120 species in N. and Cent. Amer. and in the Old World from Eu. and N. Afr. to E. Asia, distributed as far south as Java. For a key to the 65 species known from E. Asia, see Rehder, The Viburnums of Eastern Asia, in Sargent, Trees and Shrubs, 2:105–116.

3917. Vetiveria zizanioides. (×⅓)

The viburnums are upright mostly rather large shrubs or sometimes small trees with usually medium-sized deciduous or evergreen foliage and white or sometimes pinkish flowers in showy flat clusters or sometimes in panicles, followed by berry-like subglobose to oblong, red, dark blue, or black fruits. The viburnums rank among the most valuable ornamental shrubs. Besides showy flowers and decorative fruits they possess handsome foliage which mostly assumes a bright fall coloring. The plants are of good compact habit. Most of the deciduous species are hardy North, but *V. macrocephalum* var. *sterile* and *V. obovatum* are tender; also *V. tomentosum*, *V. Wrightii*, *V. theiferum*, *V. colinifolium*, *V. nudum*, and *V. dilatatum* are not quite hardy farther north than New England. Of the evergreen species, *V. rhytidophyllum* is the hardiest and at the same time one of the most distinct and handsomest species of the genus, with its bold foliage and the large clusters of flowers and fruits; it is hardy as far north as Massachusetts in favorable positions; also *V. japonicum* stands several degrees of frost, but cannot be relied on north of Philadelphia; *V. odoratissimum* and *V. suspensum* are still tenderer. The viburnums are well suited for borders of shrubberies or planting along roads, and the more showy ones are handsome as single specimens on the lawn. They are mostly medium-sized shrubs, 5–10 feet high, but *V. Lentago*, *V. prunifolium*, and *V. rufidulum* sometimes grow into small trees, 30 feet high, while *V. acerifolium* hardly reaches 5 feet. The most decorative in fruit are *V. Opulus*, *V. dilatatum*, and *V. Wrightii*, with scarlet or red berries which remain a long time on the branches. Besides the snowball forms, *V. dilatatum*, *V. tomentosum*, *V. Sieboldii*, *V. prunifolium*, *V. rufidulum*, *V. venosum*, and *V. denta-*

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tum are very handsome in bloom. Varieties with all the flowers of the cymes sterile and enlarged are known in the case of *V. Opulus*, *V. tomentosum*, and *V. macrocephalum*, the common, the Japanese and the Chinese snowballs; all these are very showy. One of the most charming in bloom is *V. Carlesii* on account of its rather large pink-and-white and deliciously fragrant flowers which appear in dense clusters early in spring before or with the leaves; almost all other species bloom after the leaves. The foliage of most species turns purple or red in fall, that of *V. Opulus*, *V. americanum*, and *V. acerifolium* being especially brilliant. *V. dilatatum* assumes a dull yellow color. *V. macrocephalum* and *V. Sieboldii* keep the bright green of their foliage until late in autumn. The viburnums are not very particular as to soil and position, but most of them prefer a rather moist and sunny situation. Some, as *V. acerifolium*, *V. Lantana*, *V. dilatatum*, *V. Tinus*, *V. pubescens*, and *V. prunifolium*, grow well in drier places, while *V. alnifolium* and *V. pauciflorum* require shade and a porous soil of constant moisture. *V. acerifolium* does well under the shade of trees in rocky and rather dry soil. *V. Tinus* is often grown in pots and thrives in any good loamy and sandy soil. With a little heat it may be forced into bloom at any time in the winter; if not intended for forcing, it requires during the winter a temperature only a little above the freezing-point and even an occasional slight frost will not hurt it. The common and the Japanese snowball are also sometimes forced and require the same treatment in forcing as other hardy shrubs.

Propagation is by seeds sown in fall or stratified; also by greenwood cuttings under glass, especiallly *V. tomentosum*, *V. macrocephalum*, *V. venosum*, *V. cassinoides*, and the evergreen species; *V. dentatum* and *V. Opulus* and its allies grow readily from hardwood cuttings and all species can be increased by layers; grafting is also sometimes practised, and *V. Opulus*, *V. dentatum*, and *V. Lantana* are used as stock.

3918. Viburnum Sieboldii. (×⅓)

The familiar snowball is seriously attacked by aphids. Fortunately its place can be taken by a Japanese species that is even more satisfactory. (Fig. 3923.) The berries of its fertile type, *V. tomentosum*, are a brilliant scarlet, changing to black. The foliage of this snowball is also remarkably beautiful. The leaves are olive-green with brownish purple or bronzy margins, and their plicate character makes them very distinct and attractive. The bush is entirely free from insect pests. The single and double forms of the Japanese species differ as shown in Figs. 3922 and 3923. Unfortunately these "single" and "double" forms have been confused in many nurseries, and only the trained eye can tell them apart in the nursery row. The double or snowball type is, of course, the one destined to the greater popularity, though the single form is a shrub of great value, especially for large estates and parks. The double form is known to nurseries as *V. plicatum*, but its proper name is *V. tomentosum* var. *plenum*. While it is hardy in New England, it is not a shrub that can be transplanted as easily as many other species. Hence it should be transplanted every second year in the nursery until it is sold. The double form may be propagated by cuttings of half-ripened wood in close frames, or by layers, which in some soils would better remain two years. French nurserymen propagate it by layering. The layers seem to suffer from winter and, to be on the safe side, it is best to cover them well with moss or leaves when the ground is somewhat frozen, so that the frost may be kept in until spring. The clusters are about as big as oranges and pure white. They are in great demand for Decoration Day in New York. The single form, unlike the double, is easily transplanted. It is also readily propagated by layers or cuttings. Both kinds are hardy in the North and make compact bushes 6 to 8 feet high.

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KEY TO THE SPECIES.

A. *Lvs. penninerved, not lobed.*
  B. *Cymes paniculate, broadly pyramidal or semi-globose.*
    C. *Foliage deciduous* ..... 1. **Sieboldii**
    CC. *Foliage evergreen.*
      D. *Corolla with cylindrical tube*.... 2. **suspensum**
      DD. *Corolla rotate-campanulate*..... 3. **odoratissimum**
  BB. *Cymes umbel-like, flat (except in the snowball forms. See Nos. 12, 16, 28.)*
    C. *Secondary veins curving and anastomosing before reaching the margin: margin entire or finely serrate.*
      D. *Branches and lvs. glabrous, hirsute, or scurfy.*
        E. *Foliage persistent, entire.*
          F. *Branches and lvs. glabrous or slightly pubescent*.... 4. **Tinus**
          FF. *Branches and lvs. hirsute*.. 5. **rigidum**
        EE. *Foliage deciduous or half-evergreen.*
          F. *Lvs. entire or slightly undulate-dentate.*
            G. *Cymes sessile: lvs. small.* 6. **obovatum**
            GG. *Cymes peduncled.*

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HH. *Peduncle shorter than the cyme: lvs. remotely denticulate*... 8. **cassinoides**
FF. *Lvs. finely and sharply serrate: cymes sessile, subtended by the upper lvs.*
G. *Petioles mostly with wavy, rather broad margin*..... 9. **Lentago**
GG. *Petioles without or with narrow, not wavy margin.*
H. *Winter buds and petioles rusty-pubescent.*10. **rufidulum**
HH. *Winter buds and petioles not rusty-pubescent*.....11. **prunifolium**
DD. *Branches and lvs. stellate-pubescent: winter buds naked.*
E. *Lvs. deciduous, dull green above: marginal or all fls. sterile*.....12. **macrocephalum**
EE. *Lvs. persistent, lustrous and wrinkled above, 3–7 in. long: fls. all fertile*.....13. **rhytidophyllum**
CC. *Secondary veins prominent, ending in the points of the teeth.*
D. *Winter buds naked: lvs. with usually numerous small teeth.*
E. *Corolla with cylindric tube, fragrant*.....14. **Carlesii**
EE. *Corolla rotate campanulate.*
F. *Cymes with all the fls. fertile.*
G. *Rays of cymes usually 7: cymes flat*.....15. **Lantana**
GG. *Rays of cymes usually 5: cymes somewhat convex*.....16. **cotinifolium**
FF. *Cymes with the marginal fls. sterile and enlarged*...17. **alnifolium**
DD. *Winter buds protected by scales: teeth rather coarse, usually less than 25 on each side.*
E. *Petioles without stipules.*
F. *Cymes with the marginal fls. sterile and enlarged*...18. **tomentosum**
FF. *Cymes with all fls. fertile and alike.*
G. *Fr. red: lvs. rounded or broadly cuneate at the base.*
H. *Foliage evergreen, glabrous*.....19. **japonicum**
HH. *Foliage deciduous.*
I. *Lvs. 3-nerved at the base, with 3–4 pairs of veins*....20. **fœtidum**
II. *Lvs. penninerved with 5 or more pairs of veins.*
J. *Both surfaces of lvs. pubescent.*.21. **dilatatum**
JJ. *Both surfaces of lvs. glabrous or nearly so.*
K. *Lvs. broadly obovate or broadly ovate: stamens usually longer than the corolla*.....22. **Wrightii**
KK. *Lvs. oblong-ovate: stamens usually shorter than corolla*.....23. **theiferum**
GG. *Fr. bluish black: lvs. cordate or rounded at the base.*
H. *Branches and lvs. glabrous*.....24. **dentatum**
HH. *Branches and lvs. beneath pubescent.*
I. *Infl. slightly pubescent: lvs. with 6–8 pairs of prominent veins*.....25. **venosum**
II. *Infl. densely pubescent: lvs. with 4–6 pairs of veins*.....26. **scabrellum**
EE. *Petioles with stipules.*
F. *Bark exfoliating: lvs. broadly ovate, 3–5 in. long, long-petioled*.....27. **molle**
FF. *Bark close: lvs. ovate, 1½–3 in. long, usually short-petioled*.....28. **pubescens**
AA. *Lvs. palmately 3–5-nerved, usually 3-lobed, slender-petioled.*
B. *Fls. all perfect.*
C. *Habit strictly upright: fr. purplish black*.....29. **acerifolium**
CC. *Habit straggling: fr. scarlet*.....30. **pauciflorum**
BB. *Fls. marginal, sterile, radiant.*
C. *Anthers yellow: bark of sts. thin.*
D. *Petiole with a narrow groove and large disk-like glands: lvs. pubescent beneath*.....31. **Opulus**
DD. *Petiole with a broad shallow groove and small glands: lvs. glabrous beneath*.....32. **americanum**
CC. *Anthers purple, rarely yellow: bark of sts. thick, corky: the upper lvs. with elongated and usually entire middle lobe*.....33. **Sargentii**

1. **Sièboldii,** Miq. Fig. 3918. Deciduous shrub, attaining 10 ft., with stout branches, pubescent when young: lvs. oval to oblong-obovate, coarsely crenate-serrate except toward the base, acute, dark green and shining above, paler and stellate-pubescent beneath, 3–6 in. long: fls. white, rotate-campanulate, in panicles 2½–4 in. broad: fr. oblong, changing from pink to bluish black. May, June. Japan. G.F. 2:559 (adapted in Fig. 3918). S.I.F. 1:86. F.E. 23:345.—Hardy shrub of vigorous growth with handsome dark green foliage, large for the genus, exhaling a disagreeable odor when bruised. The frs. drop soon after ripening. It is known in some nurseries as *V. japonicum*, *V. latifolium*, or *V. japonicum latifolium*. Var. **reticulàtum,** Rehd. (*V. reticulàtum*, Hort.). Smaller in every part: lvs. of lighter green, less pubescent: half-hardy. Var. **variegàtum,** Hort. Lvs. variegated with white.

2. **suspénsum,** Lindl. (*V. Sandánkwa*, Hassk.). Evergreen shrub, attaining 6 ft., with slender warty branches: lvs. oval to oval-oblong, acute or obtusish, usually remotely crenate-serrate toward the apex, shining and dark green above, paler beneath, glabrous, 2–4 in. long: fls. white, tinged pink, in dense semi-globose panicles becoming 1½ in. high; corolla ½in. long, with cylindric tube twice as long as limb: fr. red, subglobose. June, July. Liu-kiu Isl. B.M. 6172.—Tender.

3. **odoratíssimum,** Ker (*V. Awabúcki* and *V. Awafùki*, Hort.). Evergreen upright shrub, attaining 10 ft., with stout warty branches, glabrous: lvs. elliptic to elliptic-oblong, acute, remotely serrate toward the apex or entire, shining and bright green above, paler beneath, glabrous, 3–6 in. long: fls. pure white, fragrant, in broadly pyramidal panicles 4 in. high; corolla rotate-campanulate: fr. red, changing to black. May, June. India to S. China and Japan. B.R. 456. S.I.F. 1:88.—Tender.

4. **Tìnus,** Linn. (*V. Laurustìnus*, Hort. *Tinus laurifòlius*, Borckh.). LAURUSTINUS (or LAURESTINUS). Bushy, 10 ft., with glabrous or somewhat hairy branches: lvs. ovate-oblong or oblong, acute, dark green, shining and glabrous above, pubescent beneath usually only on the veins, 2–3 in. long: fls. white or pinkish white, slightly fragrant: cymes somewhat convex, 2–3 in. broad: fr. ovoid, black, rather dry. May–

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CXVI. Viburnum tomentosum.

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Aug., or in the greenhouse in early spring and winter. Medit. region. B.M. 38. Gn. 70, p. 113; 77, p. 601. Gn.W. 18:297.—Handsome free-flowering shrub, often cult. as a pot-plant N. Var. **Froèbelii**, Nichols. Compact form with light green lvs. and pure white fls. Var. **hírtum**, Ait. Lvs. pubescent beneath and ciliate. Var. **lûcidum**, Ait. (*V. lùcidum*, Mill. *V. grandiflòrum*, Hort.). Lvs. and cymes larger, more tender and not adapted for forcing. Gn. 15, p. 196. Gt. 5:192. Var. **purpûreum**, Hort. Lvs. suffused with a dull purple tinge. Var. **stríctum**, Loud., not Ait. Of erect and fastigiate habit. Var. **virgâtum**, Ait. Lvs. oblong-lanceolate, pubescent on the margin and on the veins beneath. Var. **variegâtum**, Hort. Lvs. variegated.

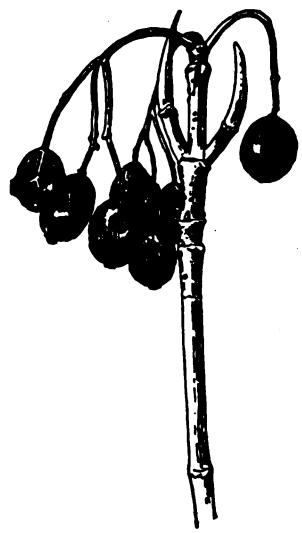
5. **rígidum**, Vent. (*V. rugòsum*, Pers. *V. latifòlium*, Hort. *V. Tinus* var. *stríctum*, Ait.). Shrub, attaining 6 ft., with spreading hirsute branches: lvs. broadly ovate to ovate-oblong, acute or obtusish, pubescent on both sides when young, almost glabrous above at length and wrinkled, 3–6 in. long: fls. pure white: cymes large, 3–4 in. broad: fr. oval, bluish black. May–July. Canary Isls. B.R. 376. L.B.C. 9:859. B.M. 2082. A.G. 14:456.—Less handsome and less free-flowering than the preceding species.

6. **obovâtum**, Walt. (*V. lævigâtum*, Ait.). Shrub, attaining 8 ft., with spreading branches: lvs. almost sessile, obovate to oblanceolate, obtuse or retuse, coriaceous, glossy, entire or obscurely crenate toward the apex, ½–1½ in. long: fls. white, in sessile cymes 1–2 in. broad: fr. oval, black. April–June. Va. to Fla. L.B.C. 15:1496.—Tender.

7. **nûdum**, Linn. (*V. nùdum* var. *Clàytonii*, Torr. & Gray). Upright shrub, sometimes attaining 15 ft.: lvs. oval to obovate or oval-lanceolate, acute or obtuse, usually entire and somewhat revolute or obscurely crenulate, thickish, scurfy on both sides when young, glabrous above at length: fls. white or yellowish white: cymes rather long-peduncled, 3–5 in. broad: fr. globose, pink at first, changing to dark blue. June, July. Long Island to Fla., west to Ky. and La. B.M. 2281.—Not quite hardy N. Var. **nítidum**, Zabel (var. *angustifòlium*, Torr. & Gray. *V. nítidum*, Ait. *V. anglicum*, Hort.). Lvs. smaller and narrower, more shining above and firmer.

3919. Viburnum cassinoides. (×½)

8. **cassinoìdes**, Linn. (*V. nùdum* var. *cassinoìdes*, Torr. & Gray. *V. squamâtum*, Willd.). Withe-Rod. Appalachian Tea. Fig. 3919. Upright shrub, 2–6, occasionally 12 ft. high: lvs. oval to ovate to oblong, acute or bluntly acuminate, usually obscurely dentate, almost glabrous, rather thick, dull green above, 1–3 in. long: fls. and fr. almost like those of the preceding species, but peduncle shorter, usually shorter than cyme; blooming a little earlier. June, July. Newfoundland to Man. and Minn., south to N. C. G.F. 9:305 (adapted in Fig. 3919). M. D. G. 1904:85, 86. Em. 2:411 (as *V. nudum*).—A good shrub for borders of shrubberies; hardy.



3920. Viburnum Lentago. (×½)

9. **Lentâgo**, Linn. Sheep-Berry. Nanny-Berry. Fig. 3920. Shrub or small tree, attaining 30 ft., with slender branches: winter buds long-pointed: petioles mostly with wavy margin: lvs. ovate, acuminate, glabrous or scurfy at the veins beneath, 2–4 in. long: fls. white: cymes sessile, 2–5 in. broad: fr. oval, bluish black, with bloom. May, June. Hudson Bay to Man., south to Ga. and Miss. S.S. 5:223, 224.—Hardy, large, often arborescent shrub, keeping its frs. until spring. Sometimes as *V. prunifolium* and *V. pyrifolium* in gardens. A garden hybrid, originated in Germany, is *V. Vétteri*, Zabel (*V. Lentago* × *V. nudum*), similar in habit to this species but the cymes on short peduncles over ½in. long.

10. **ruffdulum**, Raf. (*V. prunifòlium* var. *ferrugíneum*, Torr. & Gray. *V. ferrugíneum* and *V. rùfotomentòsum*, Small). Large shrub or small tree, attaining 25 ft. or more, with rather stout branches: winter buds scarcely pointed, obtuse, rusty-pubescent: petioles often with narrow margin, rusty-tomentose: lvs. elliptic to obovate, usually obtuse, glabrous and shining above, rusty-pubescent on the veins beneath, 2–4 in. long: fls. pure white: cymes 3–5 in. broad: fr. oval, dark blue, glaucous, ½in. long. April–June, later than the following species. Va. to Fla., west to Ill. and Texas. S.S. 5:225 (as *V. prunifolium*, partly).—Handsome arborescent shrub with dark green shining foliage, showy fls. and decorative fr.; has proved hardy at the Arnold Arboretum, Boston.

11. **prunifòlium**, Linn. (*V. pyrifòlium*, Poir.). Black Haw. Stag-Bush. Shrub or small tree, attaining 15 ft., with spreading, rather stout branches: winter buds short-pointed, glabrous or reddish, pubescent: lvs. broadly oval to ovate, acute, or obtuse, glabrous or nearly so, 1–3 in. long; petioles often with narrow margin, glabrous: fls. pure white: cymes sessile, 2–4 in. broad: fr. oval to subglobose, bluish black and glaucous, little over ⅓in. long. April–June. Conn. to Fla., west to Mich. and Texas. A.F. 12:1100. Gng. 5:310. M.D.G. 1901:628. F.E. 17:701.

12. **macrocéphalum**, Fortune, Shrub, attaining 12 ft. and occasionally more, with spreading branches: lvs. short-petioled, oval to ovate-oblong, rounded at base, acute, denticulate, almost glabrous and dark green above, stellate-pubescent beneath, 2–4 in. long: fls. yellowish white, in peduncled cymes, 3–5 in. across, with the mar-

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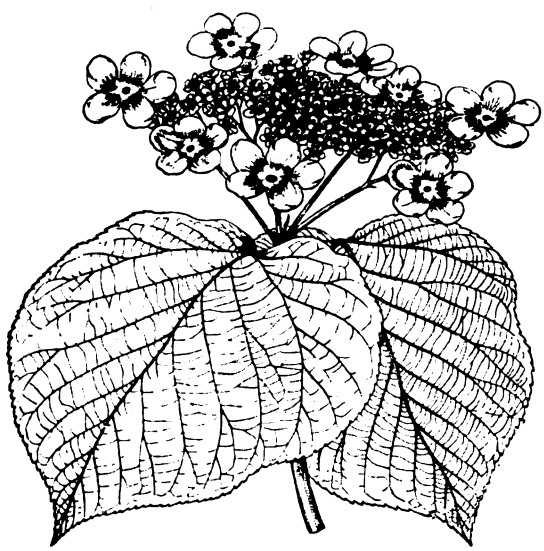
ginal fls. sterile and radiant. May, June. China. Gn. 79, p. 336. Var. **Keteleèri,** Nichols. (*V. Keteleèri*, Carr.). The wild form with only the marginal fls. sterile and enlarged; has proved hardy at the Arnold Arboretum. R.H. 1863, p. 270. Gn. 45, p. 423. Var. **stérile,** Dipp. (*V. Fórtunei*, Hort.). CHINESE SNOWBALL. All the fls. sterile, forming a subglobose ball, sometimes 7 or 8 in. across. B.R. 33:43. F.S. 3:263, 264. R.H. 1858, p. 350. Gn. 34, p. 348; 45, p. 422; 56, p. 82; 71, p. 142. G.C. III. 25: suppl. June 3; 30:332. F.S.R. 2, p. 205. A.F. 16:1547. G. 1:61; 35:381 (as *V. macrophyllum*). A very showy variety, but less hardy than the type.

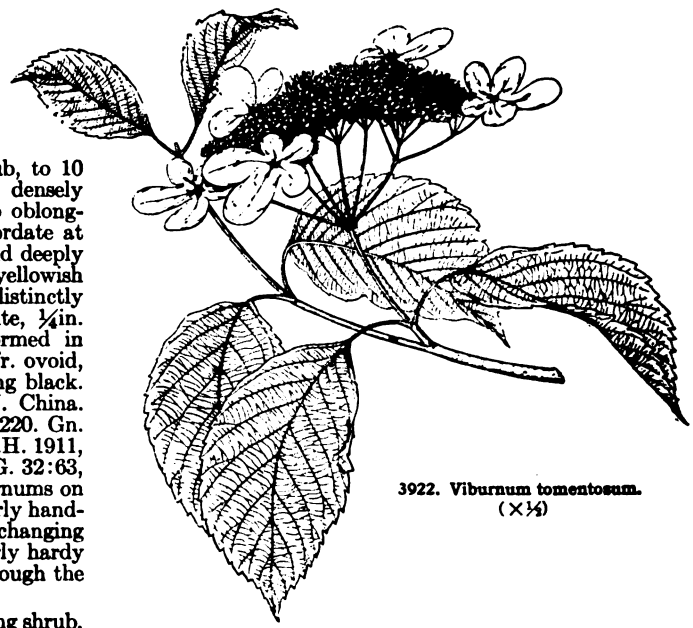
13. **rhytidophýllum,** Hemsl. Evergreen shrub, to 10 ft., with stout upright branches; branchlets densely stellate-tomentose: lvs. thick, ovate-oblong to oblong-lanceolate, acute or obtuse, rounded or subcordate at the base, dark green, glabrous and lustrous and deeply wrinkled above, covered with a thick gray or yellowish tomentum beneath and reticulate, entire or indistinctly denticulate, 3–7½ in. long: fls. yellowish white, ¼in. across, in terminal cymes 4–8 in. across formed in autumn and expanding the following spring: fr. ovoid, ⅓in. long, first red, finally changing to shining black. May, June; fr. in Sept., Oct. Cent. and W. China. B.M. 8382. S.T.S. 2:118. G.C. III. 39:418; 42:220. Gn. 78, p. 283. J.H.S. 28:63; 33:187 (fig. 103). R.H. 1911, p. 229. M.D.G. 1912:29. M.D. 1912:201. G. 32:63, 645; 37:228.—One of the most striking viburnums on account of its large evergreen foliage; particularly handsome in autumn with its large clusters of fr. changing from red to shining black. It has proved fairly hardy at the Arnold Arboretum, and in W. N. Y., though the lvs. suffer more or less in exposed situations.

14. **Cárlesii,** Hemsl. Much-branched spreading shrub, to 4 ft.: young branchlets stellate-tomentose: lvs. broadly ovate or oval, acute, usually rounded at the base, irregularly toothed, dull green and pubescent above, pale and stellate-tomentose beneath, 1–3½ in. long; petiole ¼–½in. long: fls. salver-shaped, about ½in. long and the limb about as much across, changing from pinkish to white, fragrant, in dense terminal subglobose cymes 2–3 in. across, appearing with the lvs.; stamens included, inserted about the middle; filaments shorter than anthers. April, May. Korea. B.M. 8114. G.C. III. 32:261; 43:346; 45:340. Gn. 62, p. 168; 69, p. 279; 72, p. 242; 78, p. 413. G. 30:223. F.E. 31:332.



3921. Viburnum alnifolium. (×½)

J.H. III. 64:126. R.B. 33, p. 356. M.D.G. 1902:271; 1907:380; 1912:493. M.D. 1912, p. 196.—One of the most charming viburnums, opening its deliciously fragrant pink-and-white fls. early in spring with the unfolding lvs.; it has proved hardy at the Arnold Arboretum. A closely related species which has been confused with *V. Carlesii* is **V. bitchuiénse,** Makino. A slenderer, more straggling shrub: lvs. smaller, usually obtuse and often subcordate: fls. in smaller cymes; anthers inserted near the base; filaments longer than anthers. Japan. Less handsome than *V. Carlesii*.



3922. Viburnum tomentosum. (×½)

15. **Lantàna,** Linn. WAYFARING TREE. Upright shrub or sometimes small tree, attaining 20 ft.: young branches scurfy-pubescent: lvs. ovate or oblong-ovate, usually cordate at base, acute or obtuse, sparingly stellate-pubescent and wrinkled above, tomentose beneath, denticulate, 2–4 in. long: fls. white: cymes dense, 2–3 in. broad, with usually 7 rays: fr. ovoid-oblong, bright red, changing to almost black. May, June. Eu., W. Asia. A.G. 18:453 and F.E. 9:593 (as *V. lantanoides*). H.W. 3, p. 131. Gn. 61, p. 324.—Hardy shrub, especially for drier situations and limestone soil. Var. **rugòsum,** Hort. With larger and very wrinkled lvs. and larger cymes. There are a number of other varieties, including some with variegated lvs.

16. **cotinifòlium,** D. Don (*V. multràtum*, C. Koch). Shrub, attaining 6 ft., with spreading branches, tomentose when young: lvs. orbicular-ovate to ovate, cordate or rounded at the base, usually obtuse, crenulate-dentate or almost entire, wrinkled above and nearly glabrous at length, tomentose beneath, 2–5 in. long: fls. white, tinged with pink, in cymes 2–3 in. broad, with usually 5 rays; corolla rather larger, funnelform-campanulate, tube longer than limbs: fr. ovoid-oblong, red, changing to black. May, June. N. W. Himalayas. B.R. 1650. G.F. 5:245. G.W. 13, p. 141. G. 37:229.—Not quite hardy N., requiring protection near Boston.

17. **alnifòlium,** Marsh. (*V. lantanoides*, Michx.). HOBBLE-BUSH. AMERICAN WAYFARING TREE. Fig. 3921. Low shrub, sometimes 10 ft. high, with wide-spreading, often procumbent branches, scurfy-pubescent when young: lvs. orbicular or broadly ovate, cordate at the base, short-acuminate or acute, irregularly serrulate, minutely pubescent or almost glabrous

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above, scurfy pubescent beneath, 3–8 in. broad: fls. white: cymes sessile, 3–5 in. broad; marginal fls. enlarged and sterile, long-pedicelled: fr. ovoid-oblong, dark purple. May, June. New Bruns. and Mich. to N. C. G.F. 2:535 (adapted in Fig. 3921).—Handsome shrub, with very large foliage, assuming a deep claret-red in fall. Var. **præcox,** Hesse. Said to bloom about 3 weeks earlier than the type. M.D. 1912, p. 370. G.W. 16, p. 495.

18. **tomentòsum,** Thunb. (*V. plicàtum*, Miq.). Fig. 3922. Strong-growing shrub, attaining 8 ft., with spreading branches, tomentose when young: lvs. broadly ovate to oblong-ovate, sometimes obovate, acute or abruptly acuminate, dentate-serrate, dark green and almost glabrous above, stellate-pubescent beneath, sometimes only on the veins, 1½–4 in. long: cymes 2–3 in. broad, long-peduncled; sterile fls. long-pedicelled: fr. ovoid, red, changing to bluish black. June. China, Japan. S.Z. 1:38. S.I.F. 1:86. G.C. III. 36:234. G. 25:424; 26:265. R.H. 1910, pp. 382, 383. Gt. 54, p. 114. G.W. 3, p. 287. G.F. 4:594 (adapted in Fig. 3922), 595. A.F. 12:1101. F.E. 18:461. Gng. 5:311. M.D.G. 1898:400. S.H. 2:502.—A beautiful hardy shrub, with handsome foliage and showy fls.; the frs. too, are decorative, especially before they change to black. In some nurseries erroneously named *V. japonicum*. Var. **parvifòlium,** Rehd. (*V. tomentòsum* var. *cuspidàtum*, Maxim. *V. plicàtum* var. *parvifòlium*, Miq.). Lvs. elliptic to oblong, abruptly long-acuminate, 1–2 in. long. Of slow growth and blooming sparingly. Var. **lanceàtum,** Rehd. Similar to the preceding variety, but lvs. narrower, lanceolate on the shoots, and gradually acuminate, more pubescent beneath: infl. smaller with fewer sterile fls. Var. **Marièsii,** Veitch. Differs little or not at all from the type. J.H.S. 27, p. 863 (fig. 195). G. 33:493, 631; 37:227. R.B. 30, p. 186. Var. **plènum,** Rehd. (*V. plicàtum* var. *plènum*, Miq. *V. tomentòsum* var. *plicàtum*, Maxim. *V. plicàtum*, Thunb.). JAPANESE SNOWBALL. Fig. 3923. All fls. sterile, forming large, globose balls 2½–3 in. across. G.C. III. 29:72; 30:321. Gn. 59, p. 113; 61, p. 261; 70, p. 27; 71, pp. 163, 319; 73, p. 7; 75, p. 347; 78, pp. 427, 472. G. 21:287. F.E. 18:677. F.S. 3:278. B.R. 33:51. A.G. 18:357. Gng. 1:263. V. 6:294. M.D.G. 1898:401. S.H. 2:503, 505. Var. **rotundifòlium,** Hort. Much like the preceding variety, but lvs. broader and blooming about 2 weeks earlier. There is also a variegated form. F.E. 31:715.

19. **japónicum,** Spreng. (*V. macrophýllum*, Blume). Evergreen upright shrub, to 6 ft., with glabrous branches: lvs. broadly or rhombic-ovate to oblong-ovate, acute or shortly acuminate, remotely dentate except at the base, 3–6 in. long: fls. in short-peduncled, glabrous cymes 2–4 in. broad: fr. globose, red. June. Japan.—Handsome large-lvd. shrub, but not hardy N.

20. **fœtidum,** Wall. (*V. ceanothoìdes*, C. W. Wright). Upright shrub with spreading branches, to 10 ft.: branchlets stellate-pubescent: lvs. obovate to rhombic- or obovate-oblong, acute or acutish, rarely short-acuminate, cuneate at the base, sinuately toothed above the middle, 3-nerved at the base and with 1 or 2 pairs more of lateral veins, glabrous above, pubescent on the veins beneath, 1–2½ in. long; petiole ¼–⅓in. long: fls. white, in cymes 2–4 in. across on lateral spreading branchlets: fr. scarlet, ovoid, ¼in. long. June. Himalayas, S. W. China. Var. **rectángulum,** Rehd. (*V. rectángulum*, Graebn.). Shrub, to 12 ft., with spreading, often pendulous branches: lvs. oblong-obovate to lanceolate, acuminate, remotely dentate or denticulate, usually nearly glabrous, 1½–3 in. long: cymes on slender, lateral branchlets often spreading at right angles. W. China.

21. **dilatàtum,** Thunb. Fig. 3924. Upright bushy shrub, attaining 10 ft., with the branches hirsute when young: lvs. roundish or broadly ovate or obovate, usually abruptly short-pointed, coarsely toothed, pubescent on both sides, 2–5 in. long: fls. pure white, in short-stalked cymes, 3–6 in. broad; corolla pubescent outside: fr. ovate, scarlet, ⅓in. long. May, June. China, Japan. B.M. 6215. S.I.F. 1:87. G.F. 4:150 (adapted in Fig. 3924). M.D.G. 1899:241, 242. A.F. 15:123.—Handsome hardy free-flowering shrub, especially decorative with its numerous scarlet frs. remaining a long time on the branches.

22. **Wrightii,** Miq. Upright shrub, to 10 ft. high, with the branches almost glabrous: lvs. almost orbicular or broadly obovate to ovate, abruptly acuminate, coarsely dentate, almost glabrous except on the veins beneath, 3–5 in. long: fls. rather large, white, in usually short-stalked, 2–4-in.-broad cymes; corolla glabrous outside; stamens longer than the corolla: fr. globose, red. May, June. Japan. S.T.S. 1:19.—Hardy shrub, similar to the preceding, but of less dense habit, with larger frs.

3923. Viburnum tomentosum var. plenum.—Japanese snowball. (×⅓)

in nodding cymes. Var. **Héssei,** Rehd. (*V. Héssei*, Koehne). Of dwarfer dense habit: lvs. broadly ovate, with fewer shallower teeth: cymes, fls., and frs. smaller: stamens as long as corolla.

23. **thefferum,** Rehd. Upright shrub, to 12 ft.: branchlets glabrous: lvs. ovate-oblong, acuminate, rounded at the base, remotely denticulate, dark green and glabrous above, glabrous beneath except silky hairs on the veins, 3–5 in. long; petiole about ½in. long: fls. in cymes, 1–1½ in. across; calyx purple; stamens shorter or as long as corolla: fr. red, ovoid, ⅓in. long. May, June: fr. in Oct. Cent. and W. China. S.T.S. 2:121.—Strong-growing shrub with handsome large foliage and ornamental bright red frs. in autumn. It has proved fairly hardy at the Arnold Arboretum, only the tips of young branches being sometimes killed back.

24. **dentàtum,** Linn. ARROW-WOOD. Upright bushy shrub, attaining 15 ft., with glabrous branches: lvs. rather long-petioled, orbicular to ovate, acute or shortly acuminate, coarsely dentate, glabrous or pubescent only in the axils of the veins beneath, 1½–3 in.

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long: fls. in long-peduncled, glabrous cymes 2–3 in. broad: fr. subglobose, bluish black, glaucous. May, June; fr. in Oct. New Bruns. to Minn., south to Ga. G.F. 10:332. Em. 2:414.—Handsome native shrub, thriving best in moist soil.

3924. Viburnum dilatatum. (×½)

25. **venòsum,** Brit. (*V. mólle,* Auth., not Michx. *V. Hancednum,* Dipp., not Maxim. *V. nepalénse,* Hort.). Fig. 3925. Shrub, to 8 ft., with grayish brown branches; young branchlets stellate-pubescent: lvs. ovate to orbicular, coarsely and sharply dentate, glabrous or nearly so above, stellate-pubescent beneath, particularly on the veins, 2–5 in. long, with prominent veins beneath; petioles ¼–¾in. long, pubescent: cyme long-stalked, slightly pubescent, 2½–4 in. across: fr. globose or globose-ovoid, ¼in. long, bluish black. June, July; fr. in Sept. Mass. to Va. S.T.S. 1:43. G.F. 4:29 (adapted in Fig. 3925). M.D.G. 1891:267. Var. **Cánbyi,** Rehd. (*V. lævigàtum,* Hort., not Ait.). Lvs. thinner, less pubescent beneath, larger and broader, the pair below the infl. often 2–3 in. broad: cymes larger. Del. to Pa. M.D.G. 1904:217 (habit). This is a very handsome variety on account of its larger bright green lvs. and larger cymes. Var. **longifòlium,** Rehd. (*V. dentàtum* var. *longifòlium,* Dipp.). Lvs. narrower and longer, generally ovate-oblong, pubescent on both sides, more densely beneath: infl. glabrous or pubescent. Blooms several weeks before the type.

26. **scabréllum,** Chapm. (*V. dentàtum* var. *semitomentòsum,* Michx. *V. mólle,* American Auth., not Michx.). Shrub, to 6 ft.: branches reddish brown; branchlets rough with stellate pubescence: lvs. ovate, rarely broadly ovate, acute or acuminate, remotely dentate with broad shallow teeth, or crenately dentate, glabrous or slightly pubescent above, stellate-pubescent beneath, 1½–4 in. long: cymes rather densely stellate-pubescent: fr. globose-ovoid, ⅓in. long, bluish black. June; fr. in Sept., Oct. Pa. to Fla. and Texas. B.B. (ed. 2) 3:271.—Has proved not quite hardy at the Arnold Arboretum.

27. **mólle,** Michx. (*V. Demetrìonis,* Deane & Rob.). Shrub, to 12 ft.: bark separating in thin flakes: lvs. orbicular or broadly ovate, cordate, shortly acuminate, coarsely dentate, pubescent beneath or almost glabrous, 2½–4½ in. long: cymes long-peduncled, puberulous, about 2½ in. broad: fr. oblong, almost ½in. long, bluish black. May; fr. in Aug. Ky., Mo., Iowa. B.B. (ed. 2) 3:272.—Has proved hardy at the Arnold Arboretum.

28. **pubéscens,** Pursh. Fig. 3926. Bushy shrub, 3–6 ft. high, with slender, upright branches: lvs. oval to ovate, rounded or cordate at base, acute or acuminate, coarsely dentate, almost glabrous above, pubescent beneath, 1½–2½ in. long: cymes short-peduncled, dense, 1½–2½ in. broad: stamens exceeding the corolla about one-half: fr. oval, almost black, slightly flattened. June, July. Que. to Ga., west to Man. and Ill. G.F. 3:125 (adapted in Fig. 3926). A.F. 12:1101. Gng. 5:311. M.D.G. 1903:404.—Handsome shrub of compact habit. Var. **affine,** Rehd. (*V. affine,* Bush). Lvs. nearly glabrous; petioles ¼–½in. long, sometimes shorter. Mo.

29. **acerifòlium,** Linn. Dockmackie. Shrub, attaining 5 ft., with slender, upright branches: lvs. orbicular or ovate, 3-lobed, with acute or acuminate lobes, coarsely dentate-serrate, pubescent or at length almost glabrous, 2–5 in. long: fls. yellowish white: cymes long-peduncled, terminal, 1½–3 in. broad: fr. almost black, ovoid. May, June. New Bruns. to Minn., south to N. C. Em. 2:414.—It grows fairly well in drier situations under trees. The foliage assumes a handsome dark purple fall color. Var. **glabréscens,** Rehd. Lvs. glabrous or nearly so beneath even while young. N. C.

30. **pauciflòrum,** Raf. Straggling shrub, attaining 5 ft.: lvs. orbicular to oval, coarsely dentate, with 3 short lobes above the middle or often without, glabrous or slightly pubescent beneath when young, 2–3½ in. long: cymes few-fld., small, on lateral, short usually 2-lvd. branchlets: fr. scarlet, subglobose. June. Lab. to Alaska, south to Vt. and Colo. in the mountains. G.F. 3:5.—It does not usually succeed well in cult.; requires shade and moist porous soil.

31. **Ópulus,** Linn. European Cranberry-Bush. Shrub, attaining 12 ft., with rather smooth light gray branches and sts.: lvs. broadly ovate, 3-lobed, with coarsely dentate-serrate, acuminate lobes, pubescent beneath, 2–4 in. long; petioles with narrow groove and large disk-like glands: fls. white, in peduncled cymes, 3–4 in. broad: fr. subglobose to oval, scarlet. May, June; fr. in Aug. Eu., N. Afr., N. Asia. H.W. 3, p. 131. R.F.G. 17:1171. S.B.F. 4:639. Var. **nànum,** Jacq. A very dwarf, compact, small-lvd. form; flowers but very rarely. Var. **stérile,** DC. (*V. ròseum* and *V. rosàceum,* Hort.). Guelder Rose. Snowball. Fig. 3927. All fls. sterile, forming large, globose heads.

3925. Viburnum venosum. (×½)

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Gng. 1:9. Gn. 56, p. 83; 76, p. 35. F.E. 15:319; 20:313. G.W. 6, p. 159.—This is a very showy variety, but it lacks the decorative frs. Var. **xanthocárpum,** Spaeth. Fr. yellow. There are also variegated forms of the type and of the sterile variety.

32. **americànum,** Mill. (*V. Opulus* var. *americànum,* Ait. *V. trilobum,* Marsh. *V. opuloìdes,* Muhl. *V. edùle,* Pursh. *V. Oxycóccus,* Pursh). CRANBERRY BUSH. HIGH CRANBERRY. Fig. 3928. Closely allied to the preceding species, but habit more open and spreading: lvs. with coarsely toothed or nearly entire lobes, pilose on the veins beneath or nearly glabrous, 2–5 in. long; petiole with shallow groove and small, usually stalked glands: cymes with shorter peduncles; stamens somewhat shorter. May, June: fr. in Aug., Sept. B.B. (ed. 2) 3:270 (as *V. Opulus*). New Bruns. to Brit. Col., south to N. J. and Ore.—Handsome native shrub, very decorative in fr., which begins to color by the end of July, remains on the branches and keeps its bright scarlet color until the following spring. The berries are not eaten by birds.

33. **Sárgentii,** Koehne. Similar to the preceding, of more upright, denser habit: bark of sts. darker, fissured and somewhat corky, young branchlets with prominent lenticels: lvs. of thicker texture, pubescent beneath, the upper lvs. with much elongated and usually entire middle lobe and small, short, spreading lateral lobes; petioles with large glands: sterile fls. larger, sometimes to 1¼ in. across; anthers purple, rarely yellow: fr. globose, in usually upright cymes. N. China, Japan. S.I.F. 2:73. S.T.S. 1:42. M.D.G. 1904:329.—Intro. under the name *V. Opulus* from Pekin. It does not seem to fruit as profusely as *V. Opulus,* but is handsomer in bloom and of more compact habit. Var. **calvéscens,** Rehd. Lvs. glabrous or nearly so beneath.

V. betulifòlium, Batal. Allied to V. Wrightii. Lvs. ovate to rhombic-ovate, coarsely serrate, glabrous except a few hairs on the veins beneath, 1½–3 in. long; petioles about ½in. with small stipules: infl. 2–4 in. across: stamens longer than corolla: fr. red. Cent. and W. China. S.T.S. 2:147.—*V. bracteàtum,* Rehd. Allied to V. pubescens. Lvs. orbicular-ovate, obtusely sinuate-dentate, pubescent on the veins beneath, 2–5 in. long; petioles about ¾in. long, stipulate: infl. 1½–3 in. across, with conspicuous bracts: fr. ovoid, bluish black. Ga. S.T.S. 1:68. Hardy at the Arnold Arboretum. —*V. buddleifòlium,* C. H. Wright. Allied to V. Lantana. Densely stellate-tomentose: lvs. oblong-lanceolate, pubescent above, grayish tomentose beneath, 3–6 in. long: infl. dense, about 3 in. across: fr. ovoid, black. Cent. China.—*V. burejaèticum,* Regel & Herder (*V. burejànum,* Herder). Allied to V. Lantana. Lvs. short-petioled, oval or ovate, acute or obtuse, denticulate, with anastomosing veins, sparingly pubescent beneath, 1½–3 in. long: infl. dense, 1½–2 in. across: fr. ovoid, bluish black. N. China, Manchuria. Gt. 11:384.—*V. cinnamomifòlium,* Rehd. Allied to V. Tinus. Evergreen: lvs. elliptic-oblong, 3-nerved, nearly entire, glabrous, 3–5 in. long: infl. loose, 5–7 in. across: fr. ovoid, ⅛in. long, shining bluish black. W. China. S.T.S. 2:114.—*V. cordifòlium,* Wall. Closely related to V. alnifolium, but without radiant fls.: cymes loose, 2–6 in. across: fertile fls. larger: lvs. usually narrower. Himalayas, W. China. S.T.S. 2:138.—*V. coriàceum,* Blume=V. cylindricum.—*V. crassifòlium,* Rehd. Hardy evergreen species: lvs. deep green, slightly toothed around margins: fls. white, with 5 prominent anthers, chocolate-colored. China.—*V. cylindricum,* Hamilt. (V. coriaceum, Blume). Evergreen shrub or tree, to 50 ft., glabrous: lvs. oval to oblong, acuminate, usually remotely toothed above the middle, 3–8 in. long: infl. 2–4 in. across, rather dense: fls. white or pinkish, tubular, ½in. long; stamens exserted: fr. black, ovoid. Himalayas, W. China. G.C. III. 52:371. S.T.S. 2:143.—*V. dahùricum,* Pall.=V. mongolicum.—*V. dasyánthum,* Rehd. Allied to V. Wrightii. Lvs. ovate to oblong, acuminate, nearly glabrous, 2–5 in. long: infl. lax, 3–4 in. across; pedicels, ovary, and outside of corolla villous: fr. red. Cent. China. S.T.S. 2:149.—*V. Dàvidii,* Franch. Allied to V. Tinus. Evergreen, compact shrub, to 3 ft.: lvs. elliptic to elliptic-obovate, short-acuminate, 3-nerved, 2–6 in. long: infl. dense, 2–3 in. across: fr. blue, ovoid, ¼in. long. W. China. R.H. 1913, p. 375. J.H.S. 38, p. 63 (fig. 44). G.M. 55:273.—*V. densiflòrum,* Chapm. Closely allied to V. acerifolium. Lower: lvs. smaller, 1–2 in., with mostly shorter lobes or none: cymes denser. W. Fla.—*V. ellíptícum,* Hook. Shrub, attaining 5 ft., allied to V. acerifolium, but lvs. not lobed, oval to elliptic-oblong: fr. oblong-oval, almost ½in. long. Wash. to Calif.—*V. eròsum,* Thunb. Allied to V. Wrightii. Lvs. oblong-ovate or oblong-obovate, pubescent on the veins beneath, 2–3½ in. long; petioles short, stipulate: cymes long-peduncled, loose, 2½–3 in. across: fr. red. Japan. G.F. 9:85.—*V. frágrans,* Bunge. Allied to V. suspensum. Lvs. deciduous, obovate-oblong, sharply dentate, glabrous beneath: panicles with or before the lvs., about 1½ in. long: corolla salver-shaped, nearly ½in. long, fragrant, white, pinkish in bud. N. China. Recently intro. and hardiness not yet tested, but probably fairly hardy as far north as Mass.; very floriferous and in bloom apparently one of the handsomest viburnums.—*V. furcàtum,* Blume. Closely related to V. alnifolium, but of more upright habit and stamens shorter than corolla: seed with the ventral furrow more open and broader. Japan. S.I.F. 2:74. S.T.S. 2:119.—*V. Harrydnum,* Rehd. Evergreen: lvs. orbicular to obovate or broadly oval, glabrous, ½–1 in. long: cymes 1–1½ in. across: fr. black. W. China. Very distinct in its small privet-like foliage.—*V. Hénryi,* Hemsl. Allied to V. Sieboldii. Evergreen, to 10 ft.: lvs. elliptic-oblong to oblong-obovate, acuminate, glabrous or nearly so, shallowly serrulate, 2–5 in. long: panicles broadly pyramidal, 2–4 in. long: fr ovoid, ⅛in. long, first red, then black. Cent. China. B.M. 8393. S.T.S. 2:116. G.C. III. 48:264, 265; 60:193. R.B. 35, p. 296. Tender.—*V. hupehénse,* Rehd. Allied to V. Wrightii. Lvs. broadly ovate, acuminate, dentate, slightly pubescent above, more densely below, 2–3 in. long; petiole stipulate: cymes stellate-pubescent: fr. ovoid, dark red. Cent. China. Hardy at the Arnold Arboretum.—*V. ichangénse,* Rehd. (V. erosum var. ichangense, Hemsl.). Allied to V. Wrightii. Lvs. short-petioled, ovate to ovate-lanceolate, acuminate, dentate, rough above, pubescent beneath, 1½–2½ in. long; petiole ½in. long or less, stipulate: cymes slender-stalked, 1–2 in. across: fr. ovoid, red. Cent. and W. China. S.T.S. 2:150.—*V. kansuénse,* Batal. Allied to V. Opulus. Lvs. slender-stalked, ovate in outline, deeply 3–5-lobed, with coarsely toothed acuminate lobes, hairy on the veins, 1–2 in. long: cymes 1–1½ in. across without sterile fls.: fr. red. W. China. A graceful shrub very distinct in its small deeply lobed lvs.—*V.*

3926. Viburnum pubescens. (×½)

3927. Snowball.—Viburnum Opulus var. sterile. All the fertile flowers are changed to sterile, showy ones. (×¼)

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lobophýllum, Graebn. Allied to V. Wrightii. Lvs. orbicular-ovate to broadly obovate, abruptly acuminate, coarsely toothed, glabrous or hairy on the veins beneath, 2–4 in. long: cymes 2–4 in. across; stamens longer than the corolla: fr. red. W. China. G.C. III. 60:197. S.T.S. 2:147.—*V. mongólicum*, Rehd. (V. dahuricum, Pall.). Shrub, to 6 ft.: lvs. broadly ovate to oval, crenate-denticulate, stellate-pubescent beneath, 1½–2½ in. long: fls. salver-shaped, in short panicles: fr. finally black. Dahuria to N. W. China. Possibly not in cult.; the plant figured as V. dahuricum in horticultural literature is not this species.—*V. orientále*, Pall. Allied to V. acerifolium: shrub, attaining 4 ft.: lvs. with simple, not fascicled hairs on the veins beneath and not glandular dotted beneath: fr. red. June, July. W. Asia. Gt. 17:567.—*V. phlebótrichum*, Sieb. & Zucc. Allied to V. Wrightii. Lvs. short-petioled, ovate to elliptic-ovate, acuminate, glabrous, except hairy on the veins beneath, 1½–2½ in. long: cymes slender-stalked, nodding, loose, 1–1½ in. across: calyx and pedicels purple: fr. ovoid, red. Japan. S.T.S. 2:120. S.I.F. 2:73.—*V. propínquum*, Hemsl. Allied to V. Tinus. Evergreen: lvs. elliptic to elliptic-oblong or ovate-lanceolate, acuminate, 3-nerved, remotely denticulate, glabrous, 1½–3½ in. long: cymes

3928. Viburnum americanum. *a*, **Single form of the common snowball as it grows in the wild; *b*, fruits.** (×¼)

1½–2½ in. across, glabrous: fr. globose-ovoid, bluish black. Cent. and W. China. S.T.S. 2:115.—*V. sympodiále*, Graebn. Closely related to V. alnifolium. Lvs. narrower, ovate to elliptic-ovate, more finely serrulate and usually rounded at the base, 3–5 in. long: cymes 2½–3½ in. across: fr. purple. Cent. and W. China. S.T.S. 2:139.—*V. urceolátum*, Sieb. & Zucc. Low straggling shrub: lvs. slender-petioled, ovate-lanceolate, crenate-serrulate, glabrous, 2½–5 in. long: fls. tubular, scarcely ⅛in. long, in slender-stalked cymes 1½–2½ in. across: fr. ovoid, black. Japan. S.T.S. 2:141. Recently intro.; one of the least ornamental in bloom.—*V. útile*, Hemsl. Evergreen shrub, to 6 ft.: lvs. elliptic-ovate to ovate-oblong, obtusish, entire, lustrous above, densely whitish tomentose beneath, 1–3 in. long: cymes stalked, dense, 2–3 in. across: fr. bluish black, ovoid, ⅛in. long. B.M. 8174. S.T.S. 2:142. G. 35:380. R.B. 35, p. 280.—*V. Veitchii*, C. H. Wright. Allied to V. Lantana. Shrub, to 5 ft.: young branchlets and petioles stellate-tomentose: lvs. ovate, acuminate, cordate at the base, remotely dentate, stellate-tomentose beneath, slightly stellate-pubescent above, 3–5 in. long: cymes 4–5 in. across, stellate-tomentose: fr. red, finally black. Cent. China.

ALFRED REHDER.

VÍCIA (classical Latin name). VETCH. TARE. Mostly weedy or insignificant-looking plants, but a few are grown for the bright flowers, others of late for green-manure crops (see *Cover-crops*), and one (*V. Faba*) is a garden bean.

Herbs, mostly climbing, with pinnate foliage, closely allied to Lathyrus, Pisum, and Lens, but differing in minute floral characters: wings adhering to the keel; style very slender, with beard or hairs all around the upper part or only at the apex: pod flat, 2- to many-seeded, 2-valved, and dehiscent, the seeds either globular or flattish; stamens diadelphous (9 and 1): fls. mostly blue or violet, sometimes yellowish or white.—About 150 species widely spread in the northern hemisphere and some in S. Amer. About two dozen species occur in N. Amer., some of the species intro. The species are mostly cool-season plants of easy cult. The interest in the vetches in this country is mostly for their value as soil-covers and for foliage. *V. sativa* and *V. villosa* are the important species at present for agricultural purposes, and *V. Cracca*, *V. Gerardii*, and *V. fulgens* are sometimes used as ornamentals. For literature, see Farmers' Bulls. Nos. 515 and 529, Bur. Pl. Ind. Circ. No. 15, and U. S. Dept. Agric. Circ. No. 45.

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A. *Pods 1–1½ in. broad with spongy septæ between the seeds; seeds oblong, funiculus attached at the end: st. thick, erect, 4-angled: lfts. without tendrils.*

1. **Fàba,** Linn. (*Fàba vulgàris*, Moench. *F. sativa*, Bernh.). BROAD BEAN. WINDSOR BEAN. ENGLISH DWARF BEAN. HORSE BEAN. Figs. 478, 479, Vol. I. Strong erect annual, 2–4 ft., glabrous or nearly so, very leafy: lfts. 2–6, the lower ones not opposite on the rachis, the terminal one wanting or represented by a rudimentary tendril, oval to elliptic and obtuse or mucronate-pointed: fls. in the axils, dull white and with a large blue-black spot: pods large and thick, from 2 or 3 in. even to 18 in. long, the seeds large and often flat. Probably native to N. Afr. and S. W. Asia. R.F.G. 22:238.—Much grown in the Old World, but the hot dry summers prevent its cult. in most parts of the U. S. It is grown successfully in parts of Canada, particularly in the maritime provinces, and also in Calif. as a winter vegetable or green-manure crop. The plant is grown mostly for cattle-feeding in the U. S. but the beans are extensively used in Eu., both full grown and immature, for human food. This bean has been cult. from prehistoric times and its nativity is in doubt. The plant is hardy and seeds should be sown early, when the season is cool. The unripe seeds are reported to have caused cases of poisoning, but little is known as to the conditions of the poison production.

AA. *Pods rarely over ⅜in. broad, without spongy septæ; seeds nearly spherical, funiculus attached at the side: st. slender.*

B. *Infl. very short-stalked or sessile: fls. medium to large, often 1–2 in the lf.-axis.*

C. *Stipules very large, mostly toothed; lvs. with 1–3 pairs of lfts.: plants annual.*

2. **narbonénsis,** Linn. FRENCH OR NARBONNE VETCH. Annual, pubescent, dark green: st. stout, erect or ascending, 4-angled, 2–4 ft. tall: lower lvs. with a single pair of lfts. without tendrils, upper with 2–3 pairs of lfts. and branching tendrils; lfts. ½–2 in. long, ⅜–1½ in. broad, somewhat fleshy, oval to elliptic or cuneate at base, entire or rarely few-toothed above: infl. 1–2 (rarely 5) -fld.: fls. stalked, ½–¾in. long; calyx-teeth unequal, banner lilac to purple or bluish, wings and keel bluish: pod broadly linear to rhombic-linear, 2–2½ in. long, ⅜in. broad, compressed; seeds brown, $\frac{5}{16}$in. diam. S. Eu., cult. for forage. R.F.G. 22:241.—Not very hardy and turns black under severe summer heat. Best adapted to the N. W. Pacific coast. It has no advantage over common vetch and the seed cost is much greater.

CC. *Stipules small; lvs. with numerous pairs of lfts.* (*V. oroboides has often only 2 hairs.*)

D. *Banner distinctly pubescent without: plants annual.*

3. **pannónica,** Crantz. Annual, shortly soft to shaggy pubescent: sts. 2 to several, prostrate to ascending or climbing, rarely unbranched, 4–20 in. long: lvs. short-petioled to nearly sessile, the lower with 4, the upper with often 8 pairs of lfts. and mostly short tendrils; lfts. very short-petioled, linear to oblong: infl. very short-stalked, 2–4 (rarely 1) -fld.: fls. ½–⅝in. long, pedicel much shorter than the calyx; corolla about 3 times longer than the calyx, yellowish to purple: pod about 1¼ in. long, ⅜in. broad, 2–8 (mostly 3–5) -seeded; seed ⅛in. diam., velvety black. S. and S. E. Eu. R.F.G. 22:243.

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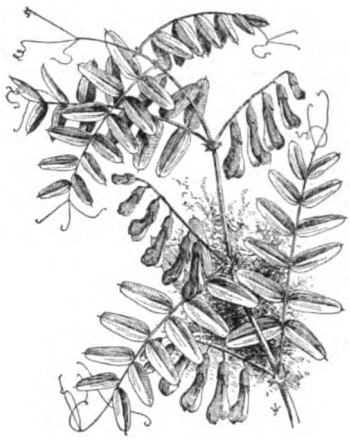
DD. *Banner glabrous or with few scattered hairs.*

E. *Plants perennial: lvs. without tendrils; lfts. few.*

F. *Lvs., lower with 1–2, upper with 4–6 pairs of lfts.: fls. single, purple-violet.*

4. **pyrenàica,** Pourr. Perennial, glabrous or nearly so: sts. 4–12 in. long, prostrate or ascending, angular: lower lvs. with only 1–2 pairs of lfts., the upper with 4–6 pairs of lfts. and unbranched or rarely 2–3-branched tendrils: fls. solitary, large; calyx sparingly pubescent; corolla purple-violet: pod broadly linear, glabrous; seed smooth, brown, mottled. S. W. France.



3929. Vicia americana. (×½)

FF. *Lvs. with only 1–3 pairs of lfts.: plant resembling a Lathyrus.*

5. **oroboìdes,** Wulf. (*Òrobus lathyroìdes,* Sibth. & Smith). Perennial, glabrous or sparingly pubescent: sts. mostly erect and unbranched, 2–3 ft. tall: lvs. short-petioled, with 1–3 pairs of lfts., ending in a sharp point, without tendrils; lfts. ovate, elliptic to oblong: infl. sessile, mostly 3–7-fld.: fls. ½–¾in. long, short-pedicelled; calyx-teeth equaling or shorter than the tube; corolla yellowish white to golden: pod linear-oblong, 1–1½ in. long; seed nearly spherical, brown, ⅛in. diam. S. E. Eu. R.F.G. 22:258. B.M. 2098.

EE. *Plants annual or biennial: fls. violet to bluish: lvs. with tendrils; lfts. many, small.*

F. *Lfts. oblong, oval or obovate.*

6. **sativa,** Linn. Common Vetch or Tare. Annual or biennial, not surviving the winter in the N., more or less pubescent, 2–3 ft. high: lfts. 7 pairs or less, elliptic, oblong or oblanceolate, mostly truncate and apiculate at the top, the tendril part of the lf. extended: fls. usually 2 in. each axil, about 1 in. long, purplish: pods 2–3 in. long when mature. Eu., and naturalized in some parts of the U. S. R.F.G. 22:248. B.B. 2:2621. —Much cult. abroad as a forage plant; in this country grown for similar purposes and also somewhat as a cover-crop for orchards. Best adapted to S. E. U. S. and the Pacific coast as a winter crop for green manure or sown with oats, wheat, rye, or barley for hay. As a spring crop it succeeds only where the summers are fairly cool. Not much injured by a temperature of 10° F. but zero weather results in much winter-killing. The name winter vetch is more commonly applied to winter strains of *V. sativa* in Eu. Seeds sometimes used for making flour. Var. **álba,** Beck (*V. álba,* Moench). Fls. white or whitish: seeds mostly whitish to gray. Var. **macrocárpa,** Moris. Fls. 1⅛–1¼ in. long: seed compressed, ⅛–⅛in. diam.

FF. *Lfts., except of the lower lvs., linear or linear-oblong.*

7. **angustifòlia,** Linn. Annual, glabrous or pubescent: sts. slender, 1–2 ft. long: lvs. short-petioled or nearly sessile with 4–8 pairs of lfts. and an unbranched or 2–3-branched tendril; lfts. linear, lanceolate or oblanceolate, up to 1½ in. long and ⅛in. wide: fls. purple, ½–¾in. long: pod glabrous, 1–2 in. long. Eu. R.F.G. 22:250. B.B. 2:2622.—Naturalized and established from Nova Scotia to Fla. The seeds mature earlier than those of *V. sativa.* In some parts of the S. it often makes up a considerable portion of the hay.

BB. *Infl. distinctly, mostly long-stalked, few- to many-fld.*

C. *Fls. ½in. long or longer: infl. mostly many-fld.*

D. *Lfts. ovate to oblong, never linear to lanceolate, few.*

E. *Pairs of lfts. 10–15.*

8. **gigantèa,** Hook. Perennial, pubescent, high-climbing: lfts. 10–15 pairs, narrow-oblong, obtuse and mucronulate: fls. about ½in. long, pale purple, in 7–18-fld. racemes. Calif. and N.—Has been offered by dealers in native plants.

EE. *Pairs of lfts. 4–9.*

F. *Color of fls. nearly white: infl. mostly 8–20-fld.*

9. **caroliniàna,** Walt. Carolina Vetch. Perennial, nearly or quite glabrous: lfts. oblong to linear-oblong, usually obtuse or emarginate: fls. nearly white, ½in. or less long, in several to many-fld. loose racemes. Minn. and Kans. eastward. B.B. 2:2616.—Has been offered.

FF. *Color of fls. blue to purple: infl. mostly 6–14-fld.*

G. *Shape of lfts. elliptic-oblong, truncate or retuse at the apex.*

10. **americàna,** Muhl. American Vetch. Fig. 3929. Perennial, trailing or climbing, 3 ft. long, nearly or quite glabrous: lfts. 8–14, elliptic to oblong, obtuse or sometimes emarginate at the apex: fls. purplish, about ¾in. long, in few-fld. loose racemes: pods 1–1¼ in. long; seed brown, ⅛in. diam. Moist lands across the continent and as far south as Ky. B.B. 2:2614.—Has been offered by dealers in native plants.

GG. *Shape of lfts. ovate, obtuse at the apex.*

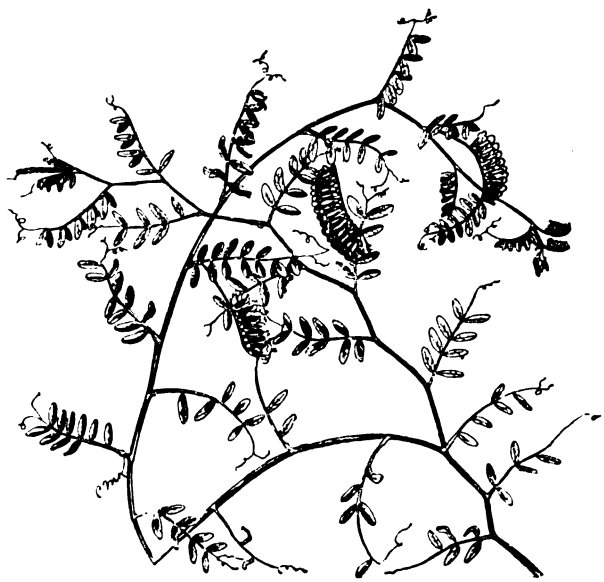
11. **dumetòrum,** Linn. Annual, glabrous: st. 1½–8 ft. long, trailing or climbing: lfts. 8–10, ovate to oblong: infl. 2- or mostly 6–14-fld.: fls. ½–¾in. long; calyx with very unequal large triangular teeth; corolla purple becoming dirty reddish yellow to greenish: pod oblong to oblong-linear, 1½–2 in. long and about ⅜in. broad; seed spherical, about ¼in. diam., dark brown. Eu. R.F.G. 22:253.—Cult. for forage in Germany.

DD. *Lfts. linear to lanceolate, numerous.*

E. *Limb of the banner as long as or longer than its claw.*

F. *Color of fls. red or nearly scarlet and purple-striped.*

12. **fúlgens,** Batt. Scarlet Vetch. Annual, 3–5 ft., pubescent: lfts. 8–12 pairs, oblong or lance-linear,



3930. Vicia villosa, the hairy vetch. (×⅓)

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mucronate: fls. small, red or nearly scarlet and purple-striped, in a compact raceme or spike. Algeria.—Adapted only to the Pacific and Gulf states. Usually of poor seed habits, but quite drought-resistant from spring sowings.

FF. *Color of fls. purplish or violet.*

13. **Crácca,** Linn. Perennial, usually pubescent: lfts. 9–12 pairs, thin, linear to oblong, mucronate: fls. purplish, about ½in. long, in a rather dense raceme. Across the continent and south to Ky.; also in Eu. and Asia. R.F.G. 22:230. B.B. 2:2613. Var. **Gerárdii,** Gaud. (*V. Gerárdii*, All.). Described as a hardy annual: pubescent: lfts. numerous, narrow-oblong, very obtuse but with a short mucro.: fls. violet, small, in short racemes. S. Eu. R.F.G. 22:233.—Offered by seedsmen as a fl.-garden subject.

EE. *Limb of banner not over half as long as its claw.*

F. *Pod glabrous.*

G. *Plant with thick, shaggy pubescence: fls. up to 1 in. long.*

14. **villòsa,** Roth. HAIRY, SAND OR RUSSIAN VETCH. Fig. 3930. Annual or biennial (sometimes perennial?), enduring the winters in the N., villous-pubescent: lfts. 5–10 pairs, elliptic-oblong, rounded at the tip but usually ending in a very minute point: fls. violet-blue, in long 1-sided axillary about 30-fld. racemes. Eu., Asia. R.F.G. 22:234.—Now considerably used as a cover-crop. More hardy than *V. sativa* but the pods shatter more easily and the seeds are smaller. In N. Italy it can be cut early enough to produce a crop of millet the same season.

GG. *Plant with short appressed pubescence: fls. only up to ⅜in. long.*

15. **dasycárpa,** Ten. Annual or sometimes perennial, slightly pubescent: st. slender, angled, climbing to prostrate: lvs. nearly sessile; lfts. about 10 pairs, oblong-ovate to linear or lanceolate: infl. short-pedicelled: fls. few to many, whitish below, blue-violet above, becoming blue with age: pod ⅞–1¼ in. long, ⅜in. broad; seeds rather large, purplish brown. Eu. R.F.G. 22:235.—As hardy as *V. villosa* and matures earlier than *V. sativa*. Produces good seed crops. Naturalized in W. Ore.

FF. *Pod pubescent: plant with thick shaggy pubescence: fls. whitish below, purplish above.*

16. **atropurpùrea,** Desf. PURPLE VETCH. Annual, resembling *V. villosa* in habit, sometimes with soft whitish pubescence: st. 8–30 in. long, angular, prostrate or climbing: lvs. with 5–8 pairs of lfts. with branched tendrils; lfts. oblong-linear to almost linear, apex pointed: infl. 2–12-fld.: fls. about ⅝in. long; corolla whitish below, purplish above: pod broadly linear to rhombic-linear, 1–1½ in. long, ⅓–½in. broad, pubescent; seeds somewhat roundish, somewhat compressed, black. S. Eu. R.F.G. 22:239. B.R. 871.—Of good seed habits. Best adapted to the Pacific and Gulf coasts and produces excellent yields from spring plantings in semi-arid regions.

CC. *Fls. ⅜in. long or less: infl. 2–4-few-fld.: plants annual.*

17. **Ervília,** Willd. (*Érvum Ervília*, Linn.). BITTER VETCH. Annual, pubescent: st. erect, angular: lvs. with 8–12 pairs of lfts. without tendrils; lfts. oblong-linear to linear: infl. 2–4-fld.; corolla rose-colored, veined: pod broadly linear, smooth, yellowish; seed smooth, reddish brown. Eu. R.F.G. 22:261.—Extensively grown in Asiatic Turkey and seed shipped in large quantities to England and other countries for stock feed, especially sheep. Yields about 30 lbs. of seed to the acre. Plants not readily eaten by livestock but it has been found to be an excellent winter green-manure crop in Calif. P. L. RICKER.

VICTÒRIA (in honor of Queen Victoria). *Nymphæàceæ.* ROYAL WATER-LILY. The great water-lily of the Amazon, sometimes grown in large aquaria.

This remarkable aquatic genus may be recognized by its huge round floating lvs. often 6 ft. or more in diam., with the margin turned up at right angles to the water surface to a height of 3–8 in., making a basin-like object. Fls. (12–18 in. across) nocturnal, opening on two successive days about 5 P.M. and remaining open until the middle of the following morning; the first evening the inner floral lvs. remain loosely closed over the stigma, the fl. is creamy white, and exhales a delicious fragrance somewhat like pineapple; the second evening the floral lvs. spread wide open, and the color changes to pink or red; ovary inferior, densely prickly, and surmounted by a short broad tube, on the sides and summit of which the floral lvs. are situated; sepals 4; petals 50–70, obtuse, oblong-ovate to sublinear, rather thin and delicate in texture; staminodia about 20; stamens 150–200, linear-lanceolate; paracarpels about 25, forming a ring of thick fleshy bodies between the stamens and the styles; carpels 30–40; stigma forming a broad basin-like depression, 2–2½ in. wide, in the midst of the fl., with a central conical continuation of the floral axis, the basin filled with fluid on the first evening of opening; carpellary styles broad and fleshy in the lower part, produced upward to a fleshy subulate incurved process about ½in. long: in fr. all of the floral lvs. have decayed away, leaving the basal tube of the torus at the top of a great prickly berry, half the size of one's head; seeds greenish or brownish black, about the size of a pea.—The genus is represented by 2 well-defined species, inhabiting still waters of S. Amer. from British Guiana to Argentina.

In its native haunts victoria grows in 4 to 6 feet of water, in great patches miles in extent, and is perennial. The tuberous rhizome stands erect in the mud, where it is anchored by innumerable spongy roots which spring from the bases of the leaves in groups of ten to thirty or forty. The tuber may be as much as 6 inches in diameter and 2 feet long. It decays below as it grows above. The leaves are arranged in 7 to 18 order, the flowers being extra-axillary. Each leaf after the first seedling leaf has a broadly ovate fused pair of stipules, these organs serving to protect the apex of the stem. The petioles and peduncles are terete, 1 to 2 inches in diameter, covered with stout fleshy prickles, and traversed internally by four large, and a number of smaller air-canals. The petioles attain to a length much greater than the depth of the water, so that the leaves can adjust themselves to changes of the water-level, though Banks states that they may be completely submerged in times of flood. The gigantic leaves are covered beneath with a close network of prickly veins, the larger of which project an inch or more from the leaf-surface; the tissues are full of air-spaces and -canals, thus buoying up the mass of cellular matter. Besides many stomata on the upper surface of the leaf, which open into the air-chambers of the mesophyll, there are countless tiny depressions, in each of which one can see with a hand-lens that the leaf is perforated with a fine hole; these holes were called by Planchon "stomatodes" (F.S. 6:249). He considered them to be useful as air-holes to let out gases which, rising from the water or mud, might be caught in the deep meshes of the netted veins on the under side of the leaf. It is also to be noted that, in spite of the cup-like form of the leaves, water from rain or other sources does not remain on the surface; it doubtless runs down at once through the tiny perforations. This would be an indispensable protection against fungi and algæ, and for the function of assimilation.

A single leaf, by its buoyancy, may sustain a weight of 150 or 200 pounds. Gurney at Tower Grove Park, St. Louis, covers the leaf with a large round quilted pad, then lays on an equally large frame of thin wooden

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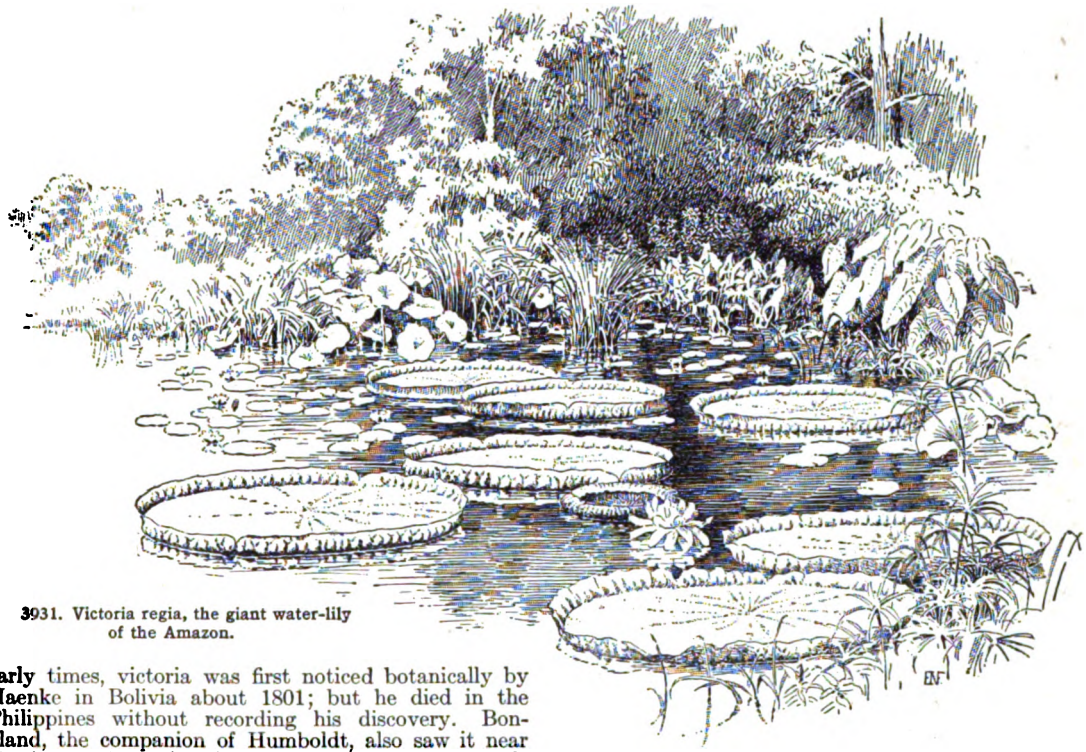
slats, and on this a person can readily stand, as if in a boat. Not the least remarkable feature of these leaves is their rate of growth. Caspary found the maximum growth in length to be about 1 inch an hour when the leaf is just expanding; the surface increases 4 or 5 square feet in twenty-four hours, and a plant will produce in twenty-one to twenty-five weeks 600 or 700 square feet of leaf-surface. A great development of heat has been observed in the opening flowers of victoria. About 8 P.M., when the anthers are shedding their pollen (in second-day flowers), the stamens may reach and maintain a temperature 10° F. above that of the surrounding air.

Though doubtless known to Spanish traders and missionaries, and certainly of use to savages as food in early times, victoria was first noticed botanically by Haenke in Bolivia about 1801; but he died in the Philippines without recording his discovery. Bonpland, the companion of Humboldt, also saw it near Corrientes, Argentina, in 1819, and in 1825 sent seeds and a full description to Mirbel at Paris. In 1832 Poeppig found it on the Amazon, and gave the first published account of it in Froriep's "Notizen" in November of that year, under the name of *Euryale amazonica*. D'Orbigny saw the plant in 1827 at Corrientes, collected specimens, and sent them with drawings to the Museum of Natural History at Paris. In 1833 he saw it again in Bolivia, and several years later published accounts of his find. Robert H. Schomburgk, finding it again in 1836 on the Berbice River in British Guiana, sent home specimens and figures from which Lindley in 1837 (published in 1838) established the genus Victoria and described the species *V. regia*. This name has settled on the northern species, while the one found at Corrientes was named in 1840, by d'Orbigny, *V. Cruziana* in honor of General Santa Cruz, of Bolivia.

The struggle to bring the "queen of water-lilies" into captivity began with Schomburgk. He removed living plants from inland lakes and bayous to Georgetown, British Guiana, but they soon died. In 1846 Bridges obtained seed in the Bolivia locality, province of Moscos, and sent them in a jar of wet clay to England. Out of twenty-five seeds obtained at Kew, three germinated and grew vigorously as small seedlings until October, but died in December. In 1848 dry seeds were sent to England from the Essequibo River, along with rhizomes, the latter in Wardian cases; the rhizomes rotted, and the seeds refused to germinate. In 1849 an expedition from Georgetown succeeded in bringing back thirty-five living plants, but these all died. Finally some seeds were sent to Kew from the Demerara River in bottles of fresh water, by two English physicians, Rodie and Luckie. The first sending arrived February 28, 1849, and on November 8 a plant flowered at Chatsworth; the blossom was appropriately presented to Queen Victoria. From this stock *Victoria regia* was distributed to gardens in Europe, Asia, and America. Van Houtte of Ghent first flowered it on the continent,



3931. Victoria regia, the giant water-lily of the Amazon.

and Caleb Cope, of Philadelphia, was the earliest successful cultivator in this country. His gardener was the late Thomas Meehan. The first flower opened August 21, 1851. In 1852 John F. Allen, of Salem, Massachusetts, had a plant from seed of Mr. Cope's growing. This plant lived through four summers and matured over 200 flowers.

The next notable importation of seed was sent by Edward S. Rand, Jr., from Para, Brazil, to Mr. Sturtevant, then at Bordentown, N. J. The resulting plants flowered in 1886 and, proving to be slightly different from the former type, were called *V. regia* var. *Randii*. It is doubtless the same form that was described by Planchon as *V. amazonica*, and retained with grave doubts by Caspary. In 1894 Mr. Tricker received from Europe seed of quite another species, which was provisionally named *V. regia* var. *Trickeri*. It is much more amenable to out-of-door culture than the older type, and has received a well-deserved popularity. Specimens grown at Kew from seeds sent by Tricker were regarded simply as garden forms of *V. regia*. Later investigation by Tricker and the writer brought out the fact that the stock came originally from Corrientes, Argentina, and that the plant is truly

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the *V. Cruziana* of d'Orbigny. Its far southern habitat (27° south) explains its hardiness. At Riverton, New Jersey, seeds that have wintered in an open pond produce plants which flower by the end of August. The large starchy seeds of this species are used as food in Paraguay under the name of *Mais del Agua*, "water-corn." The form of victoria originally introduced from British Guiana had leaves entirely flat until the plant attained considerable size; then a low rim appeared. The leaf was deeply purple-colored beneath. *V. Cruziana* differs markedly from this. *V. regia* var. *Randii* approaches the latter; and Malme's recently described *V. Cruziana* forma *mattogrossensis* approaches *V. regia* in several details. Apparently the two species grade into one another in Matto Grosso, where the tributaries of the Amazon and the Parana rivers interlace.

For much interesting information on Victoria, see Hooker, "Botanical Magazine" 4275–4278; Planchon, "Flore des Serres" 6:193–224; Caspary in "Flora Brasiliensis" 4, part 2, page 143 ff. In 1854 John Fisk Allen published in Boston a quarto work (pages 21 by 27 inches) with colored plates, entitled: "Victoria regia, or the great water-lily of America. With a brief account of its discovery and introduction into cultivation: with illustrations by William Sharp, from specimens grown at Salem, Massachusetts, U. S. A."

règia, Lindl. Fig. 3931. Lvs. sparingly pubescent beneath, margins of lvs. of diam. above 40 in., turned up 2–4 in. high: fls. becoming dull crimson the second evening; sepals prickly almost or quite to the tips: prickles of the ovary about ⅜in. (10–11 mm.) long: seed elliptic-globose, nearly ½in. long, less in diam. (7–8 mm. long, 5½–6 mm. diam.); raphe indistinct; operculum elliptic-orbicular, with the micropyle at its center and hilum at the margin. British Guiana. B.M. 4275 (poor); 4276–78 (incorrect in some details). F.S. 6:595–604. Kerner, Natural History of Plants, pl. xi. Tricker, Water Garden, pls. 1, 2; pp. 21, 35. Caspary, Fl. Brasil. 4, pt. 2, pl. 38, fig. 15 (seed). Var. **Rándii,** Hort., has rim of lf. 5–6 in. high, and under side of lf. deeper red: fl. turning to deep crimson on second day. This is the form commonly cult. in American gardens now as *V. regia*. Amazon and its tributaries. A.G. 18:469. Intro. by Sturtevant in 1886.

Cruziàna, d'Orbigny (known in cult. as *V. règia* var. *Trickeri*, and *V. Trickeri*). Lvs. densely villous beneath, upturned margins green, 6–8 in. high: fls. becoming deep red-pink the second evening; sepals prickly only at base, smooth above: prickles of ovary over ½in. (15–16 mm.) long, crowded: seed subglobose, about ⅓in. (7½–9 mm.) diam.; raphe stout; operculum elongate-ovate, with hilum and micropyle equidistant from the margin. Parana River and tributaries, Paraguay. Tricker, Water Garden, pl. 1; pp. 51, 55. Caspary, Fl. Brasil. 4, pt. 2, pl. 38, fig. 16 (seed). Gn.M. 1:267. A.G. 19:449. F.E. 10:suppl. Feb. 12 (1898).—Intro. by Wm. Tricker in 1894. Forma **mattogrossénsis,** Malme, has low rim on lf.: seed very large (8–10 mm. diam.) with broadly oval operculum: sepals either smooth or spiny. Corumba, state of Matto Grosso, Brazil. Acta Hort. Bot. Bergiani, 4:pls. 1–4 (1907).

HENRY S. CONARD.

Cultivation of victorias.

At first *V. regia* was cultivated at a great expense in conservatories and tanks built especially for the purpose. Then it was grown in artificially heated ponds in the open air. The victoria is largely grown in private and public gardens throughout the United States at the present time, together with tropical nympheas, and in some cases without artificial heat, but this method of culture is uncertain and often unsatisfactory. *V. Cruziana* is by far the best kind for out-of-door culture. Moreover, it can be grown where *V. regia* fails to grow, as it revels in a temperature of only 75° to 80°. Its introduction has been of great interest. It has stimulated the culture of aquatic plants in the United States, also in Europe where it is now largely grown.

The *Victoria regia* is now considered of easy culture. Its requirements are heat, light, and a rich mellow loam in abundance. The seed should be sown in February and March. The temperature of the water should range between 85° to 90° F. The seed may be planted in pots or seed-pans and placed in shallow water. A tank 8 to 12 inches deep, having a metal lining, copper preferred, is very serviceable for seedlings and young plants. Where sufficient heat is not attained from the heating pipes, an addition can be made by the use of an oil-lamp. It is altogether unnecessary and unnatural to file or chip the seed to assist or hasten germination. The seedlings will appear in about twenty days, though occasionally a few may appear in ten days. These should be potted off singly into 2½-inch pots, using fine loamy soil. The water temperature for the young plants should be the same as directed for the seed-pots. As soon as the young plants acquire their first floating leaf they will doubtless be benefited by repotting. From the very beginning, as sprouted seeds, they should be kept steadily growing, repotting at intervals, until they are planted out in their summer quarters. As the young plants advance they will require more space, so that the leaves are not crowded and overlap each other.

To raise plants of *V. Cruziana* (*V. Trickeri*) is altogether a different matter. The seed will not germinate in a high temperature; 65° to 70° is sufficient. The seed may be sown in February, but there is great uncertainty as to how long one must wait for the seedlings to appear, and also as to what percentage of seeds will germinate. As soon as the seedlings appear they should be treated like seedlings of *V. regia*, except as to temperature, which should be kept as above stated for seedlings and small plants, and as the season advances may be raised to 75° to 80°. The rationality of the cool treatment here advocated is borne out by the fact that early in June quantities of seedlings appear in the pond in the open where a plant has grown the preceding season, the seed having remained in the pond during the winter. Planting in summer quarters may be done early in June or whenever it is safe to plant out tender nympheas, that is, when the pond is not artificially heated. When it is desired to plant out in unheated ponds it is not safe to plant before the middle or latter end of June. The conditions of the weather, earliness or lateness of the season, locality, and the like, must all be taken into account.

The best results are to be obtained from an artificially heated pond, or pits in the pond specially constructed to start the victorias, these pits to be heated by hot water or steam and covered with frames and sashes. By this method plants may be set in their summer quarters early in May and heat applied until the middle of June, or rather a temperature of 85° maintained until the advent of summer weather.

Very gratifying results are obtained when the victoria is grown under glass, as it is thus grown in several places in the United States, notably at Schenley Park, Pittsburgh, and Allegheny Park; also at "Greystone," the estate of Samuel Untermyer, Yonkers, New York, also at many notable gardens in Europe. Plants grown under glass usually attain to larger dimensions, as they are protected against climatic changes and the elements, besides enjoying more of a tropical atmosphere. There is more than one disadvantage, however. Setting aside the costly construction, labor, and so on, it is by no means inviting even on a warm day to spend many minutes in such a structure. Compare this with a natural pond and its surroundings and a cool shady seat where these gorgeous plants may be viewed at leisure.

Whether grown indoors or out, these plants are only

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annuals, and seedlings are of necessity raised every spring. They form no tubers as do the tender nymphaeas, or rootstock as do the hardy nymphaeas.

Few, if any, insects are troublesome on these plants. The worst is the black-fly or aphis. The use of insecticides should not be resorted to, as they are most likely to damage the foliage. The safest remedy is to introduce a colony or two of the well-known "lady bug." They and their larvæ will soon clear off all the aphides without any injury to the plant. WM. TRICKER.

VÍGNA (Dominic Vigni, Paduan commentator on Theophrastus in the seventeenth century). *Leguminòsæ.* Herbs grown mostly for the seeds and fodder; the cowpea group.

The usual cultivated species of Vigna are annual bean-like rambling vines with 3 rhomboid-ovate stalked lfts., the lateral ones unequal-sided, the petioles long:

3932. Vigna strobilophora. (×½)

fls. bean-like, white, pale to violet-purple and pale yellow, borne 2 or 3 together on the summit of a long axillary peduncle: pods slender, straight, or slightly curved, a few inches to 3½ ft. long; seeds small, nearly round to kidney-shaped, bean-like, white or dark, self-colored or variously mottled, usually with a different color about the eye.—Species 60 or more, tropical. The species show great variation in stature and growth-habit, and particularly in the color of the seeds. The genus may be distinguished from Phaseolus by the fact that the keel is bent inward at right angles but is not coiled. Vigna resembles Dolichos in having a similar keel but differs from it in the form and position of the stigma. In the former species this is lateral, occupying a position just beneath the apex of the style and above the line of pubescence which extends up the inner face of this organ. Just opposite the stigma the apex of the style is bent backward and prolonged into a beak. The stigma in Dolichos, on the other hand, is terminal or merely oblique. The prolonged beak of the style is also absent. Vigna may be further distinguished from Dolichos in the shorter petioles of the first pair of aërial lvs. In Vigna these are about ¼in. long or shorter, whereas in Dolichos they are 1 in. long or longer.

Three species of Vigna are in common cultivation: the cowpea, *V. sinensis;* the catjang, *V. Catjang;* and the asparagus bean, *V. sesquipedalis.* The asparagus bean (*V. sesquipedalis*) can be used as a forage plant for stock, or the green pods may be cooked as a snap bean since they are more tender and brittle than those of the cowpea or catjang. This species is little grown, however, due to a lack of productivity, except as a curiosity or novelty. The nomenclature of the cultivated varieties of the cowpea and catjang is almost hopelessly confused. Piper enumerates 220 agricultural varieties of the former and 50 of the latter. Formerly the name cowpea was restricted to the buff-colored or clay-pea, but it is now commonly used generically; it is an Americanism. Common generic terms now in use in the South are "black-eyed pea" and "corn-field pea." While the cowpea and the catjang are now employed mostly for animal food and green-manuring, the pea itself is a good human food and has been so used for many years. For table use the peas are best gathered when the pods first begin to change color; however, they are most extensively used from the dry ripe pods. As long ago as 1855 an excellent essay on cowpeas was written by Edmund Ruffin ("Essays and Notes on Agriculture," Richmond, 1855). Piper (Bulletin No. 229, Bureau of Plant Industry, United States Department of Agriculture) describes these three species as follows:

sesquipedàlis, W. F. Wight (*Dòlichos sesquipedàlis,* Linn.). Seeds elongated kidney-form, 8–12 mm. (⅓–½in.) long, their thickness much less than their breadth; pods pendent, much elongated, 1–3 ft. long, fleshy and brittle, becoming more or less inflated, flabby and pale in color before ripening, and shrinking about the widely separated seeds when dry. S. Asia.

Cátjang, Walp. Seeds small, usually oblong or cylindric and but slightly kidney-shaped, 5–6 mm. (⅕–¼in.) long, nearly or quite as thick as broad; pods small, not at all flabby or inflated when green, mostly 3–5 in. long, erect or ascending when green, remaining so when dry or at length becoming spreading or even deflexed. Probably S. Asia.

sinénsis, Endl. Seeds mostly 6–9 mm. (¼–⅜in.) long, varying from subreniform to subglobose; pods 8–12 in. long, early becoming pendent, not at all flabby or inflated when green. Probably Cent. Afr.

Some species of Vigna are useful for ornament. *V. strobilóphora,* Robs., from Mex. (Fig. 3932), is said by Pringle (G.F. 7:155, from which Fig. 3932 is reduced) to have abundant fls. that rival those of the wisteria in beauty. It is a twining woody vine climbing to tops of trees and shrubs: st. slender and flexuous, pubescent: lfts. 3, ovate, acuminate, entire, rounded at base, 2½ in. long: fls. in dense axillary peduncled racemes, blue-purple, standard orbicular, slightly retuse, with 2 small appendages at base; bracts large, closely imbricated. *V. vexillàta,* Benth. (*Phasèolus vexillàtus,* Linn.), widely spread in the tropics and warm parts of Old World, is intro. in S. Calif.: woody perennial with pink fls., the rootstock tuberous, hairy: lfts. usually ovate-lanceolate to narrow-lanceolate, entire, 2–4 in. long: fls. 2–4 in a cluster on summit of peduncle; standard nearly 1 in. across, reflexed: pod 3–4 in. long, nearly cylindrical. GEO. F. FREEMAN.

VIGUIÈRA (Dr. A. Viguier, botanist of Montpellier, France). *Compósitæ.* About 60 or 70 species of herbaceous or somewhat shrubby plants, found in the warmer parts of the world, especially Amer. The following is a native of Low. Calif. and is offered in S. Calif., but is little known otherwise. It is a tall bushy

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plant with silvery foliage and small yellow fls. like single sunflowers, but borne in ample corymbs. Rays fertile, or more often sterile, in wild plants sometimes wanting; pappus of 2 chaffy awns: achenes usually pubescent. The plant blooms both winter and summer.

tomentòsa, Gray. Shrub or branching subshrubs: lvs. opposite, subcordate, serrate, tomentose on both sides, 3–5 in. long: heads corymbose: achenes villous, with 2 long awns and many small scales.

N. TAYLOR.†

VILLAGE IMPROVEMENT: *Planting*, Vol. V, p. 2658.

VILLARÈSIA (named for Matthias Villarez, a Spanish botanist). *Icacinàceæ*. Evergreen tall climbing trees or shrubs, adapted to the warmhouse: lvs. alternate, oblong, entire or spinulose-dentate, thick, leathery, shiny: cymes small, head-like, arranged in axillary or terminal racemose panicles or racemes: fls. white, hermaphrodite or polygamous; calyx 5-parted; petals 5, ribbed inside; stamens 5, disk inconspicuous; ovary 1-celled: drupe ellipsoid.—About 13–15 species, distributed in the islands of the Pacific, Trop. Austral., Indian Archipelago, and Brazil and Chile.

grandiflòra, Fisch. Tree, smooth with subangular branches: lvs. sparse, petioled, coriaceous, ovate-lanceolate, narrowed toward the base, apex acuminate, greenish above, paler beneath: panicles terminal, clustered: fls. sessile, small, white; calyx tubular-campanulate, lobes 5, ovate; petals 5, spreading, lanceolate. Brazil. Gt. 6:181.

mucronàta, Ruiz & Pav. (*Ilex gongónha*, Mart.). Tree, usually 40 ft. high, rarely 50–60 ft.: lvs. short-petioled, ovate or elliptic-oblong, apex spinulose, leathery, dark green, shining above, paler and dull beneath: fls. 5-merous, in solitary shortly pubescent thyrses, terminal or in the upper axils, yellowish white; sepals wide elliptic or nearly orbicular; petals elliptic-oblong; ovary by abortion 1-celled: drupe ovoid. Chile. B.M. 8376. —Prop. by cuttings. Rare in cult.

F. TRACY HUBBARD.

VILLÁRSIA (named for Dominique Villars, 1745–1814). *Gentianàceæ*. Marsh-loving herbs, suitable for greenhouse cult.: sts. simple and leafless or somewhat branched and few-lvd.: lvs. radical, long-petioled, entire or irregularly sinuate-dentate: cymes usually many-fld., sometimes laxly paniculate, sometimes corymbosely congested or capitate and involucrate: fls. yellow or white; calyx 5-parted or deeply 5-cleft, segms. lanceolate; corolla broadly campanulate or rather rotate; stamens 5: caps. 1-celled, subglobose, apex 4-valved.—About 10 species, S. Afr. and Austral. *V. reniformis*, R. Br. (*Menyánthes exaltàta*, Sims. *M. sarmentòsa*, Sims). From 6 in. to 3 ft. high: lvs. in a dense tuft on long petioles, ovate, orbicular or reniform, more or less cordate, entire or slightly sinuate-dentate, mostly 1–2 in. long: fls. yellow; corolla ¾–1 in. across, lobes copiously fringed or bearded at the base inside. Austral. B.M. 1029; 1328. R.H. 1909, p. 125.

VIMINÀRIA (Latin, *vimen*, a slender twig or withe, alluding to the branches). *Leguminòsæ*. Shrub, with rush-like branches, adapted to greenhouse cult.: lvs. alternate, reduced to long filiform petioles or rarely 1–3-foliate: fls. small, orange-yellow, arranged in terminal racemes; calyx-teeth short, equal; petals rather long-clawed, standard suborbicular, wings oblong, keel incurved, equaling the wings; stamens free; ovary subsessile, 2-ovuled: pod sessile, ovoid-oblong, rather indehiscent.—One species, Austral., little known to horticulturists.

denudàta, Smith. The name LEAFLESS RUSH-BROOM has been proposed for this. Leafless yellow-fld. shrub, attaining 10–20 ft., formerly cult. in European greenhouses as a small tender shrub: lvs. 3–8 in. long: pod 2–3 lines long. Austral. B.M. 1190. P.M. 14:123.—Offered in S. Calif.

F. W. BARCLAY.

VÍNCA (*pervinca*, old Latin name of periwinkle, used by Pliny). *Apocynàceæ*. Erect or procumbent or trailing herbs or subshrubs, some used for bloom in the flower-garden, others for decorative foliage in the greenhouse and in window-boxes and others for permanent ground-cover out-of-doors.

Leaves opposite: fls. axillary, solitary, rather large; calyx 5-parted, not glandular, lobes narrow, acuminate; corolla salver-shaped, tube cylindrical, lobes 5, large, twisted, overlapping to the left; stamens included, above the middle of the tube; disk none; ovary 2 distinct carpels, glabrous: follicles 2, erect or divergent, narrowly cylindrical.—About 12 species, Medit. region, Trop. Amer., India, and Madagascar.

3933. Vinca minor, the common periwinkle, or running myrtle. (Natural size)

One of the commonest and best plants for covering the ground in deep shade, especially under trees and in cemeteries, is *V. minor*. It is a hardy trailing plant with shining evergreen foliage and blue salver-shaped five-lobed flowers about an inch across, appearing in spring or early summer. It forms a dense carpet to the exclusion of other herbs. It thrives best in moist half-shaded positions, but will grow in the deepest shade even in poor soil, especially if it is stony. It is a capital plant for clothing steep banks, covering rocks, and carpeting groves. It can be planted successfully on a large scale any time from spring to fall during mild or

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rainy weather. It is propagated by division or by cuttings, as seeds very rarely mature. The periwinkle will live in city yards under trees where grass will not thrive. *V. minor* is the commonest and perhaps most variable species. Varieties with white, purple, and double flowers are kept in most nurseries, as also a form with variegated foliage. *V. major* is larger in all its parts than the common periwinkle and not so hardy. It is well known to florists. A variegated form of it is seen in nearly every veranda-box in the country. *V. rosea* is a tender plant of erect habit which is used chiefly for summer bedding. It grows about a foot high and has rosy purple or white flowers with or without a reddish eye, and often 2 inches across. The plants bloom continuously from the time they are set out until frost. It can be grown in large masses for public parks with somewhat less expense than geraniums. Mr. Stromback, head gardener of Lincoln Park, Chicago, has recorded his experience with *V. rosea* in Florist's Review 1:141 as follows: "The seed is sown in January or February in flats of sandy soil in a temperature of 65° to 70°. When the seedlings show the second leaf, they are pricked out about an inch apart in trays of the same soil, and when the little plants have five or six leaves they are potted into 2-inch rose-pots, and later shifted to 3-inch pots. The majority are bedded out from the 3-inch pots. The soil of the bed should be a sandy loam if possible, and the plants will not do well in a very heavy soil. In bedding, set the plants about a foot apart. They require more water than a geranium, and when the bed is watered it should be given a good soaking and then let alone for a few days. The plants require no trimming." The amateur will find *V. rosea* a satisfactory window-plant that can be grown with little trouble from seeds started as late as April, but of course such plants will not bloom as early as the bedding stock propagated in January or February. *V. rosea* is the largest-flowered vinca, and it seeds freely. (Wilhelm Miller.)

A. *Plants trailing, herbaceous, hardy or nearly so, only the short flowering sts. ascending: fls. mostly blue or white.*

B. *Foliage evergreen.*

C. *Lvs. ovate or oblong-ovate: corolla-lobes wedge-shaped; calyx glabrous.*

mìnor, Linn. COMMON PERIWINKLE. BLUE, RUNNING, or TRAILING MYRTLE. Fig. 3933. Hardy evergreen, trailing herb: fl.-sts. erect, sometimes nearly a foot high: lvs. ovate, oblong-ovate, or elliptic-lanceolate, not more than 1½ in. long, glabrous, petiole very short with 2 glands at the top: fls. lilac-blue; calyx-lobes lanceolate, rather obtuse; corolla-lobes cuneate, obtuse and truncate. Eu. G. 2:64.—Common in all country gardens and running wild in cemeteries and shady places. Some of the horticultural varieties are: Var. **álba,** Hort., which has single white fls. Var. **álba plèna,** Hort., with double white fls. Var. **álba variegàta,** Hort., is a form with variegated lvs. and single white fls. Var. **argéntea variegàta,** Hort., has the lvs. silvery variegated. Var. **atropurpùrea compácta,** Hort., has single dark purple fls. Var. **aûrea,** Hort., has been in the trade, a form with golden foliage. F.E. 33:479. Var. **aûrea variegàta,** Hort., has golden variegated lvs. Var. **cærùlea,** Hort. (*V. cærùlea,* Hort. *V. cærùlea mìnor,* Hort.), is a form with bright blue, single fls. There is also a form known as *V. cærùlea argéntea marginàta,* Hort., which has the lvs. margined with silvery white. Var. **flòre-plèno,** Hort., probably the same as var. *plena.* Var. **plèna,** Hort., has double fls., otherwise like the type. Var. **purpùrea plèna,** Hort., has double purple fls. Gn. 50:102. Var. **rôsea,** Hort., has single rosy fls. Var. **rôsea fl.-pl.** Hort., is like the last but double-fld. Var. **variegàta,** Hort., is a variegated-lvd., blue-fld. form offered in the trade. *V. elegantíssima álba,* Hort., and also "The Bride," a form with white fls. which are pink-centered belong to this species.

CC. *Lvs. subcordate-ovate: corolla-lobes obovate.*

diffórmis, Pourr. Subshrub, evergreen and dwarf: branches prostrate and leafy; flowering shoots ascending: lvs. ovate, base rounded or shortly cuneate, apex acutish or obtuse, 1¼–2¾ x 1–1¾in., glabrous, petioled: fls. solitary in the uppermost axils, 1 in. or more across, pale lilac-blue; sepals linear; corolla-segms. obliquely obovate. S. Eu., N. Afr. B.M. 8506.—Rare in cult.

màjor, Linn. Sterile sts. reclining; flowering sts. rather erect: lvs. subcordate-ovate, rather obtuse, ciliate, shining, 2–3 x 1–2 in.: fls. blue; calyx-lobes narrowly linear, ciliate; corolla-lobes obovate, very obtuse. Eu.—This species is larger throughout than *V. minor.* It is much used, especially the variegated forms, for veranda-boxes and hanging-baskets. Var. **elegantíssima,** Hort., is a showy form with the lvs. margined and blotched with yellowish white. Common form among the florists and easily prop. by cuttings. Var. **reticulàta,** Hort., is offered in the trade. Var. **variegàta,** Hort., is offered in the trade. G. 27:330.

3934. Vinca rosea. (× nearly ½)

BB. *Foliage deciduous or less evergreen.*

herbàcea, Waldst. & Kit. Hardy trailing glabrous herb, which usually loses its lvs. in winter: lvs. elliptical or lanceolate, rather obtuse, margins revolute; petiole very short: fls. more purple than the other species; calyx-lobes narrowly lanceolate, acuminate; corolla-lobes obovate, oblong-obtuse. E. Eu., Asia Minor. B.M. 2002. B.R. 301.

AA. *Plants erect, subshrub, tender: fls. rosy or white.*

rôsea, Linn. MADAGASCAR PERIWINKLE. Fig. 3934. Tender erect everblooming plant, somewhat shrubby at the base: lvs. oblong, narrowed at base, veiny; petiole glandular at the base: fls. with a very small orifice, rosy purple or white, the latter with or without a reddish eye; calyx-lobes linear, corolla-lobes dimidiate-obovate, mucronulate. Cosmopolitan in the tropics. Gn. 36, p. 455; 43, p. 389. V. 13:49; 16:49. B.M. 248. F.R. 1:141. G. 11:197; 14:333; 37:205.—This is commonly called the "Madagascar periwinkle," but *V. rosea* is probably not native to the Old World, while the only species of Vinca that is really native to Madagascar, viz., *V. lancea,* is not in cult. The plant is sometimes called "Cape periwinkle" and "old maid." The three main types should be known as *V. rosea, V. rosea* var. *alba, V. rosea* var. *oculata,* the latter being a white fl. with pink or red center. As a matter of fact, these appear in American catalogues as *V. alba, V. alba pura, V. alba nova, V. oculata,* and *V. varius,* the last being a trade name for seed of mixed varieties. Var. **delicàta,** Hort., is a trade name.

V. acutiloba, Hort., is a trade name for a white-fld. form, closely related to V. major.

F. TRACY HUBBARD.†

VINCETÓXICUM (compound meaning *to conquer* or *subdue poison,* alluding to supposed virtues). *Asclepiadàceæ.* By some combined with Cynanchum (which see), but differing in anthers having only short scarious tips and bearing horizontal rather than suspended pollinia. There are about 75 species, all in Amer., mostly

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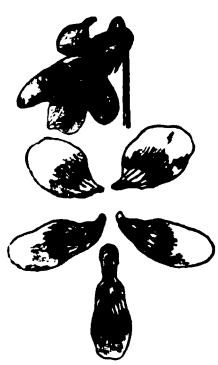
in warm or tropical parts: they are twining or trailing woody or perennial herbaceous vines, with opposite cordate simple lvs. and small greenish or purplish fls.: corolla campanulate or rotate, deeply 5-cleft and the parts sometimes reflexed; crown small, mostly ring-like or cup-like and thereby differing from the awned crown-lobes of Gonolobus (Definition of Gonolobus, p. 1356, to be amended): follicles thick, pointed, muricate or ribbed or both. Several species are native in the U. S. from Pa. and Va. southward, but apparently they are not in cult. The mosquito plant or cruel plant, sometimes named in this genus, is here treated as *Cynanchum acuminatifolium*.

VINES: *Planting*, Vol. V. (Index p. 2657.)

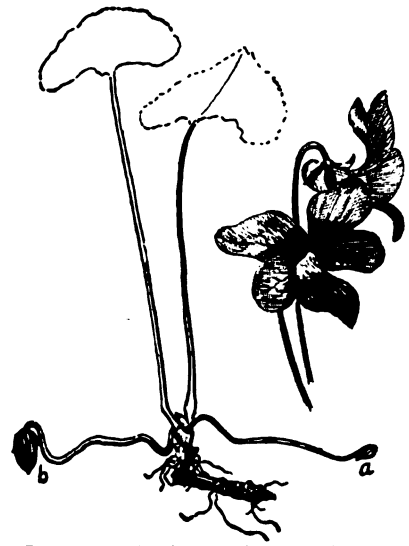
VIOLA (classical name). *Violàceæ*. VIOLET. PANSY. Usually perennial herbs with attractive spring or early summer bloom, and well adapted for colonizing in grounds and one species for forcing; in the pansy group, many species are handsome winter annuals or biennials; and in the Andes and the Sandwich Islands, and in southern Europe shrubby species occur, but they are scarcely cultivated. See *Violet*.

Either stemless, bearing lvs. and 1-fld. scapes from the crown of the rootstock, or stemmed with manifest internodes between the lvs., from the axils of which arise 1-fld. peduncles: fls. usually of two kinds, those of spring with showy petals (Fig. 3935) and those of summer with petals rudimentary or lacking—fls. never opening but self-pollinated within the closed calyx (cleistogamous). (Fig. 3936.) The showy fls. of spring are 5-merous as to sepals, petals, and stamens, irregular and novel in structure as though contrived to prevent self-pollination; sepals nearly similar, persistent on the fr.; the lower petal of the nodding fl. spurred, the other 4 in 2 unlike pairs, the petals in each pair symmetrically alike; stamens short and included, the anthers more or less coherent in a ring about the style, 2 of them with nectar-bearing appendages projecting backward into the spur: fr. a caps. with several (up to 60) obovate seeds; caps. when ripe splitting into 3 boat-shaped valves with thick rigid keels; as the thin sides of the valve dry and contract the seeds within are more and more pinched, until they fly out, one or two at a time, to a distance often of 9 ft.: later cleistogamous fls. in some of the stemless species not growing in wet ground are borne on short horizontal peduncles concealed under soil and leaf-mold until the seeds are ripe, when the peduncle lengthens and lifts the caps. into the air, where it scatters its seeds as did the earlier caps. (Fig. 3936.) See Rhodora, vol. vi, plate 50, for cleistogamous fls. and frs. of 6 other species.—Probably 300 species widely distributed in the N. and S. Temp. zones of both the Old World and the New, of which about 80 species are native to N. Amer. north of Mex.



3935. Structure of the flower of Viola papilionacea.

The classification of the wild violets into species was for many years a perplexing task, because students of the genus failed to recognize the fact that all closely allied species freely hybridize in nature. But in 1900 the important discoveries of Mendel became generally known to biologists, and gave rise to the new science of genetics. With a better understanding of the laws of inheritance that determine the characters of offspring from unlike parents, it is practicable in a genus like Viola to discover what forms are proper species and what are hybrids or the offspring of hybrids. Some of the tests employed by the specialist in Viola may be briefly indicated as follows: (1) The hybrid is notably intermediate in its characters between two well-known species found in the same vicinity. (2) The hybrid usually shows great impairment of fertility, 50 to 100 per cent of the ovules being aborted, but a marked increase in vegetative vigor. (3) The pollen-grains of most hybrids are seen under the microscope to be largely shriveled and functionally impotent. (4) The hybrid is found to be unstable in sexual reproduction; that is, the offspring of the self-fertilized hybrid are more or less unlike the parent and unlike each other; the offspring of pure species are not thus unlike.



3936. The two kinds of violet flowers,—the common showy flowers at the right (natural size), and the cleistogamous flower at a, its immature pod at b (×½).—Viola papilionacea.

By experimental cultures extending over twelve years, the writer has ascertained the existence of about eighty spontaneous hybrids among the violets of eastern North America—that is, more hybrids than there are pure species. In Wilhelm Becker's systematic treatise on the violets of Europe (published in 1910), eighty-three hybrids are reported among the one hundred and two species there recognized. Any reader caring for the details of the work on American violets will find a dozen or more papers in Rhodora and in the Bulletin of the Torrey Botanical Club (1904–1913); see also Science, June, 1907, and American Naturalist, April, 1910.

Violets are easily grown if an effort is made to imitate the conditions under which they naturally occur. They usually require abundant moisture and partial shade, and a light covering of fallen leaves or evergreen boughs in winter. The habitats are various: some are wood species, others from bogs or borders of springs and brooks; still others, especially in the western United States, inhabit dry plains, remaining dormant during the drought of summer. They are propagated readily by division if the plant is fairly large, and in some nine of the American species by runners. Sometimes seeds are used, but not commonly. However, species of the northeastern United States germinate readily in April, if fresh seed is sown in autumn in boxes and exposed, covered with burlap, to the freezing cold of winter. Many species, that grow mostly to single stems in the wild, make large clumps under favorable conditions in the garden (Fig. 3942). But few of the native violets are grown to any extent as garden plants. *V. pedata*, the bird's-foot violet, a most attractive species, is

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sometimes cultivated, as is the hardy grower, *V. papilionacea* (Fig. 3936). A partial albino of this, the petals white with a large blue center, is grown in southern gardens as "the confederate violet." It has been published as *V. Priceana*, the type coming from Bowling Green, Kentucky; but it is perfectly hardy in the North, and multiplies abundantly. Many hybrids of *V. sororia* and of *V. pedatifida* are also hardy, some with violet flowers, others with white flowers, often fifty or more blooming at once in a large clump.

No attempt is made here to describe all the native species, as they are so numerous and so rarely horticultural subjects. For any desired information regarding them the reader is referred to the most recent editions of Gray's "Manual," of Britton & Brown's "Illustrated Flora," or of Small's "Flora of the Southeastern United States," the treatment of Viola in all three works being by the present writer. However, as a matter of record, a list of those that are or have been offered in the trade is here given, and references made to illustrations found in horticultural magazines. With the recent critical studies of Viola, it is found that two or more species were sometimes comprised under a single name; it is therefore difficult, in some cases, to determine what plant may be in cultivation under one of the older names. It is now considered that the European *V. canina* is not indigenous in America; probably the plant listed under that name is *V. conspersa*.

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A. *Species of exotic origin, comprising the florist's violets and the pansy.*

B. *Plant stemless, the peduncles arising directly from the base or crown.*

c. *Style truncate at apex.*

1. **hederàcea,** Labill. (*Erpètion renifórme*, Sweet. *E. hederàceum*, *E. petiolàre*, and *E. spathulàtum*, Don). AUSTRALIAN VIOLET. Tufted, and creeping by stolons, glabrous or pubescent: lvs. reniform or orbicular or spatulate, small, entire or toothed, usually not equaling the scapes: fls. small, usually blue, sometimes white, the spur almost none. Austral. G. 35:35.—Offered in S. Calif.

cc. *Style terminating in a slender hooked beak.*

2. **odoràta,** Linn. SWEET VIOLET. Fig. 3937; also Figs. 3947–49. Tufted, somewhat pubescent, producing long prostrate stolons flowering the second year: rootstock short: lvs. cordate-ovate to reniform, obtusely serrate; stipules ovate-lanceolate, acuminate, the fringed border usually not glandular: fls. deep violet, rarely rose or white, fragrant, the spur nearly or quite straight and obtuse. Eu., Afr., and Asia.—It runs into many forms varying in stature, size of fls. and color. There are double-fld. forms. It is the parent of florists' violets. Fig. 3937, from G.C. III. 21:248, represents var. *sulfurea*, "reported to be a native of the south of France, and bears dull sulphur-coloured flowers." *V. californica* of gardeners on the Pacific coast is only the sweet violet of Eu. For cult., see *Violet*.

3. **cyànea,** Celak. Stemless, stoloniferous: lvs. broadly cordate-ovate, crenate, bright green, glabrate and shining after flowering; stipules lanceolate, long-acuminate, fimbriate: pedicels 2–4 lines long, about equaling or slightly shorter than the petioles after flowering; sepals oblong, obtuse, with short appendages which are rotundate and appressed to the pedicel; corolla medium-sized; petals sky-blue-white below the middle, lower petal emarginate, the others about as long, scarcely emarginate; spur conical, rather straight; ovary short-conoid, very smooth. Eu.

Var. **perfimbriàta,** Borb. (*V. bosnàna*, Wiesb. *V. rússica*, Hort.). Stolons short, rather thick: lvs. broadly cordate-ovate, vivid green, at flowering-time glabrous and shining; stipules lanceolate, long-acuminate, long-fringed, nearly glabrous: fls. less fragrant than in *V. odorata;* petals a cornflower-blue above the middle, white below. Lower Austria and southeastward. G. 36:362.

4. **álba,** Bess. Stolons long, ascending, appearing in spring and sometimes bearing fls. the same season: lvs. nearly triangular, cordate, with deep and broad

3937. Viola odorata. (×⅔)

sinus, obtuse; stipules lanceolate, long-acuminate, with glandular fringe: fls. fragrant, usually white, but sometimes in various shades of violet and rose. Cent. and S. Eu.

BB. *Plants with evident sts., more or less branching, the peduncles arising some distance above the ground or crown.*

c. *Style slender throughout.*

5. **silvéstris,** Reichb. (*V. silvática*, Fries). Sts. reclining and ascending, glabrous or slightly pubescent: lvs. deeply cordate or nearly reniform, short-pointed or obtuse; stipules linear-lanceolate, fringed-toothed, several times shorter than the petiole: sepals lanceolate, acuminate; petals oblong, narrow, not overlapping. Widely distributed in Eu. G.W. 13:73.

6. **elàtior,** Fries. Sts. tall and straight: lvs. lanceolate from a rounded or cordate base, when young with appressed pubescence; the middle stipules as long or

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longer than the petiole, the upper much surpassing it: corolla large, pale blue. Cent. Eu. and southeastward.

cc. Style much enlarged upward into a globose hollow summit.

7. calcaràta, Linn. (*V. valdèria*, Huter). Rootstock producing filiform creeping branches: st. simple, 4 in. high: lvs. ovate, or the upper oblong to lanceolate, crenate; stipules nearly or quite pinnately divided: spur as long as the large violet corolla. Alpine region of Cent. Eu. G.W. 12:709. Gn. 62, p. 97.

3938. Viola cornuta. (×⅓)

8. grácilis, Sibth. & Smith (*V. olýmpica*, Boiss.). One of the *V. calcarata* group, and by some authors included in that species: entire plant hairy, internodes more or less elongated, 1 ft. high: lvs. oblong and narrowed to petiole, or broad-ovate to nearly rotund and abruptly contracted below, somewhat obtuse at apex, the margin crenate; stipules pinnately parted: fls. medium size, the petals violet or yellow; sepals oblong-lanceolate, acute, shorter than petals; spur exceeding calyx appendages. Macedonia to Asia Minor.

9. Munbyàna, Boiss. & Reut. Another of the *V. calcarata* kind: plant about 1 ft. high, with long internodes, very short-pubescent: lvs. cordate-ovate, obtuse, crenate, glabrous or the margin ciliate, the upper ones somewhat acute; stipules pinnatifid: fls. 1–3, the petals violet or yellow; sepals lanceolate; spur straight, attenuate at the end, about twice longer than the calyx. Algeria.

10. lûtea, Huds. Plant persisting by filiform prostrate branching sts.: stipules digitately much divided, middle division linear and enlarged: sepals oblong-lanceolate, obtuse or short-pointed; spur hardly longer than the appendages of the calyx; petals yellow, rarely the two upper or all of them violet. Cent. Eu. and Great Britain.

11. cornûta, Linn. Horned Violet. Bedding Pansy. Fig. 3938. Plant tufted, glabrous or nearly so, producing evident sts. with long peduncles in the lf.-axils: lvs. subcordate-ovate and usually acuminate, crenately serrate; stipules triangular, large, coarsely dentate: fls. normally violet, the petals obovate-obtuse, standing well apart, the spur slender, acute, shorter than the petals. Spain and the Pyrenees. B.M. 791. G. 32:417. Gn. 73, p. 385.—Frequently seen in gardens and much prized for its large bright fls. Good for spring bloom. Hardy. There are several colors. Var. **álba,** 8, p. 449. Var. **purpûrea,** Hort. G.M. 52: **apílio,** Hort. (Fig. 3939) has very large fls., or, with small dark eye. Var. **admirábilis,** den group of various colors, is probably a ot of this species. *Manne Queen* is a form s.

3939. Viola cornuta var. Papilio. (×½)

r, Linn. Pansy. Heartsease. Fig. 3940; 48, 2749. Glabrous or nearly so, the sts. ng and branched: basal lvs. cordate or e, those of the st. becoming ovate-oblong , all stalked and crenate-dentate; stipules large, pinnately parted toward the base: fls. large, usually about three colors represented (except in high-bred self varieties), the spur usually twice as long as the appendages of the calyx. Eu. G.Z. 27:1. R.B. 38:137.—When strayed from cult., the fls. become small and lose the markings characteristic of the high-bred pansies. A small-fld. field form, becoming common, is the European *V. arvénsis*, Murray. A similar but more delicate species, distinguished by petals longer than the calyx, **V. Rafinésquii,** Greene (*V. tricolor* var. *arvénsis*, American Auth., not DC.), is indigenous to the U. S. from N. J., southward and westward to Texas and Colo. For cult., see *Pansy*

aa. Species native in the U. S. and Canada, not domesticated but sometimes planted from the wild.

b. Plants stemless.

c. Petals normally violet or purplish.

d. Lvs. more or less dissected.

3940. Viola tricolor. (×½)

13. pedàta, Linn. Bird-Foot Violet. Rootstock short and erect: plant glabrous: lvs. pedately 3–5-parted or -cleft, the segms. usually 2–4-cleft or -toothed near the apex: petals all beardless. Sandy soil, Mass. and Minn. to Fla.; a handsome species. G.Z. 11:144. Gn. 65, p. 383. G. 13:373; 22:68.—In the typical form the 2 upper petals are dark violet, the 3 lower pale lilac; the concolorous form is by far the more common. A form with petals nearly white is known as var. **álba.**

14. palmàta, Linn. Fig. 3941. Rootstock stout, usually oblique rather than erect: first lvs. in spring sometimes less divided but later lvs. palmately 5–11-lobed or -parted, middle segm. largest, all of them variously toothed or cleft: fls. violet-purple, about ½–1 in. across; lateral petals bearded; sepals rather blunt, ovate-lanceolate; produces cleistogamous fls. on prostrate peduncles. Woodlands, Mass. to Minn. and to Fla.

15. pedatífida, Don. Rootstock short and erect: lvs. palmately multifid, primarily 3-parted or -divided, each segm. again 3-cleft or -parted into linear subdivisions, these often further cut into 2–4 lobes: fls. showy, violet, on scapes surpassing the lvs.; produces cleistogamous fls. with yellowish caps. on erect peduncles. Prairies, Ohio northwestward and southwestward.

dd. Lvs. lanceolate or oblong-lanceolate.

16. sagittàta, Ait. A small species, with erect short rootstock, usually glabrous: mature normal lvs. lanceolate or oblong-lanceolate, hastately or sagittately toothed

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or incised at the base; earlier and later lvs. more deltoid and often only crenate at base: fls. violet-purple; sepals narrow-lanceolate, acute. Banks and fields, Mass. to Minn. and southward.

DDD. *Lvs. cordate-ovate to cordate-reniform.*

17. **papilionàcea,** Pursh (*V. cucullàta* of older Manuals). Figs. 3935–6, 3942. Commonest and most variable violet in the N. E. U. S. A robust plant, with a strong branching horizontal rootstalk, 3–6 in. high: lvs. deltoid-ovate to cordate-ovate, not lobed, bluntish, serrate, the long petiole somewhat pubescent: fls. normally deep violet but white or greenish yellow in the center; outer sepals ovate-lanceolate; petals narrow; spurred petal often narrow and boat-shaped; cleistogamous fls. usually underground but caps. erect. **V. Priceàna,** Pollard, is probably a form of this, with white blue-centered fls. Ky. See remarks on p. 3473. —Besides albinos there are striped and pied forms now in the trade known as vars. **striàta, pícta,** and **variegàta,** Hort. All forms are easily colonized in the garden. G.M. 57:313. G. 3:323 (both as *V. cucullata*). Gt. 1:194.

18. **sorória,** Willd. Much like No. 17, but petioles and lower surface of lvs. villous-pubescent: a sturdy grower, in pubescence, shape of lf., and color of fl. resembling the European *V. odorata,* whence named by Willdenow in 1806 the "sister violet." (Latin *soror,* a sister.) Woods and moist meadows and about buildings, Que. to Minn. and southward.

3941. Viola palmata. (×½)

19. **pratícola,** Greene. A prairie species of the Middle West, from Ind. to Minn. and Colo.; like *V. papilionacea,* but less robust, and often united with that species: petals violet-purple but of a lighter shade than in No. 17, the petals broadly obovate.

20. **septentrionàlis,** Greene. Scapes and lvs. more or less hirsutulous: lvs. ovate to reniform, cordate at base, somewhat attenuate but blunt at the apex, crenate-toothed and ciliate, the petioles slender: fls. large, of a rich violet-purple (rarely white or whitish); 3 lowest petals villous at base; sepals ovate and usually obtuse; cleistogamous fls. on ascending peduncles. Newf. and westward along the Canadian border, to Brit. Col. and southward to Conn.—Albino forms, varying all the way to pure white, occur in New England.

21. **nephrophýlla,** Greene (*V. cognàta,* Greene). Nearly or quite glabrous: lvs. orbicular to somewhat reniform, crenate-serrate, obtuse, the later ones broadly cordate: fls. large, deep violet, on long peduncles; spurred petal villous, the lateral ones densely bearded; sepals ovate to lanceolate, obtuse; cleistogamous fls. erect. Cold mossy bogs and borders of streams and lakes, Newf. to Brit. Col., south to N. W. Conn. and N. Wis., and in high mountains to New Mex. and Cent. Calif.

22. **Sélkirkii,** Pursh. A very distinct small species with pale violet beardless petals, the spur long and much enlarged toward the rounded end: glabrous except for minute spreading hairs on the upper surface of the lf.-blades: lvs. thin, ovate to nearly orbicular, deeply cordate with a narrow sinus, crenate: sepals lanceolate or ovate-lanceolate, usually acute; cleistogamous fls. erect or ascending. Shaded ravines and cold mountain forests, New Bruns. to Brit. Col., south in the Alleghanies to Pa. and in the Rocky Mts. to Colo., and north to Greenland; also in N. Eu.

CC. *Petals always white.*

D. *Lvs. lanceolate or narrower.*

23. **lanceolàta,** Linn. Small glabrous species, with erect habit: lvs. lanceolate or elliptical, obscurely crenulate, gradually narrowed into a margined more or less colored petiole: fls. white, but the 3 lower petals with purplish veins, all usually beardless; sepals lanceolate; cleistogamous fls. erect. Open moist places, Nova Scotia to Minn. and southward. — A distinct and interesting species.

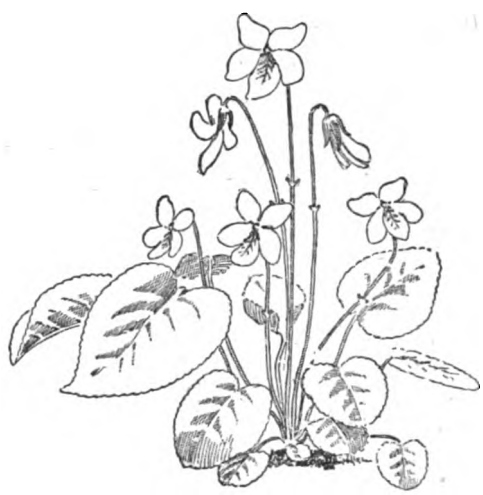
3942. Clump of common blue violet of the eastern states.—Viola papilionacea.

DD. *Lvs. ovate, with either narrowed or rounded base.*

24. **primulifólia,** Linn. Usually glabrous but sometimes pubescent: lvs. oblong to ovate, usually rounded at the base or cuneate, obscurely crenate-serrate, the petioles often manifestly winged above: fls. white with purplish veins, on peduncles exceeding the lvs.; sepals lanceolate, acuminate; 3 lower petals beardless or slightly bearded; cleistogamous fls. on shortish erect peduncles. Open moist ground, New Bruns. to Fla. and La.

DDD. *Lvs. cordate.*

25. **pállens,** Brainerd. Small neat species, for the most part glabrous, stoloniferous: lvs. broadly ovate or cordate-orbicular, sometimes only ½in. wide, but usually 1½–2 in., crenate-serrate, obtuse: fls. faintly fragrant, white; lateral petals usually with small tuft of hairs, the upper ones broadly obovate. Springy land and along cold brooks, Que. and southward,



3943. Viola blanda. (×1)

especially in the mountains to S. C. and Tenn.—The plant formerly known by many as *V. blanda,* and still often confused.

26. **blánda,** Willd. Fig. 3943. A northern species extending southward in the mountains to N. Ga., has acuminate lvs. somewhat hairy on the upper surface, and narrow strongly reflexed petals. Probably not in cult.

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DDDD. *Lvs. kidney-shaped.*

27. **renifòlia,** Gray. Pubescent to nearly glabrous: rootstock in mature plants mostly stout and scaly: mature lvs. of summer reniform, distantly crenate-serrate, rounded at the summit: fls. white; petals beardless, the 3 lower ones veined or tinged brownish; sepals narrow-lanceolate; cleistogamous fls. purple, on horizontal peduncles: stolons absent. Arbor-vitæ swamps and cold woods, Newf. to the Mackenzie River, and southward in the Alleghany and Rocky Mts.

3944. Viola rostrata. (×½)

CCC. *Petals yellow.*

28. **rotundifòlia,** Michx. Plant with long and stout scaly rootstocks, and making short stolons: lvs. in midsummer oval, 2–4 in. wide, thick and prostrate, crenate, fls. bright yellow, with brown lines on the 3 lower petals; lateral petals bearded; cleistogamous fls. on deflexed peduncles. Cold woods in the mountains from Maine to N. Ga.

BB. *Plants with evident sts.*

C. *Species eastern, or found east of the 100th meridian.*

D. *Petals yellow.*

29. **Núttallii,** Pursh. Pubescent or nearly glabrous, with a deep stout rootstock: early lvs. and fls. from near the crown, the later fls. cleistogamous and on long peduncles: lvs. oblong-lanceolate, tapering into margined petioles, obtuse at apex, crenate-dentate or entire: fls. yellow, the petals beardless or with slight beards; sepals lanceolate or linear. From the Rocky Mts. eastward to Dak. and Mo.

30. **eriocárpa,** Schw. (*V. scabriúscula,* Schw.). Essentially glabrous or sparingly pubescent, the sts. ascending: root-lvs. usually 1–3, long-petioled, ovate to reniform, the base cordate or truncate, the apex usually rounded; st.-lvs. all on upper half of st., broad-ovate, subcordate, apex acuminate: fls. yellow, the lateral petals bearded; sepals narrowly lanceolate. Low woods, Nova Scotia to Man. and far southward.

31. **pubéscens,** Ait. Markedly soft-pubescent: sts. 8–12 in. high, stout, often only one: root-lvs. usually wanting; st.-lvs. near the top, short-petioled, broad-ovate to reniform, the base cordate or truncate, crenate-dentate, somewhat short-pointed; stipules large: fls. bright yellow; lateral petals bearded; spur short; sepals narrow-lanceolate. Dry rich woods, Nova Scotia to N. D. and to Va. and Mo.

DD. *Petals white inside with bright yellow base.*

32. **rugulòsa,** Greene (*V. Rýdbergii,* Greene). Plants widely spreading from long underground stolons: first lvs. broad and densely pubescent underneath, long-petioled, cordate-reniform and abruptly acuminate: fls. sometimes tinged with violet. Minn. and westward to Colo. and Brit. Col.

33. **canadénsis,** Linn. Plants without stolons, glabrous or very nearly so: lvs. broad-ovate, cordate, at apex acute or acuminate, serrate, the stipules sharp-lanceolate: fls. solitary from the axils of the st.-lvs., white inside with yellow center, the outside more or less tinged with violet, the 3 lower petals with darker lines, the lateral petals bearded; sepals subulate. Woods, New Bruns. to Sask. and Rocky Mts., to Ala. and Ariz.

DDD. *Petals a uniform white or cream-color.*

34. **striàta,** Ait. Plants cespitose, often 2 ft. high at maturity in summer, the sts. angular and leafy: lvs. nearly or quite glabrous, ovate to orbicular, cordate, mostly acuminate, closely crenate-serrate; stipules large and fimbriate: fls. white or cream-colored, long-stalked; sepals linear-lanceolate and ciliolate; spur thick and blunt. Shady places, N. Y. to Minn., Ga. and Mo.

DDDD. *Petals usually violet-blue.*

35. **conspérsa,** Reichb. (*V. canìna* var. *Mùhlenbergii,* Gray). Plant glabrous, 3–6 in. high, with oblique often much-branched rootstock: lower lvs. cordate-orbicular, obtuse, crenate-serrate, not large (¾–1½ in. wide); upper lvs. rather smaller and somewhat acuminate: fls. many, pale violet (running to white), overtopping the foliage; lateral petals bearded; spur 2–4 lines long; sepals acute. Que. to Minn. and Ga., in low or shaded places.

36. **rostràta,** Pursh. Fig. 3944. Glabrous or nearly so, 4–8 in. high, the sts. often numerous and plant forming a small clump: lvs. orbicular to broad-ovate, cordate, the upper ones acute, all serrate: fls. lilac with darker spots; petals beardless; spur long (⅓–½in.) and slender; cleistogamous fls. later on short axillary peduncles. A distinct and attractive species, in open woods and on hillsides, Que. to Mich. and southward.

3945. Viola Sheltonii. (×½)

CC. *Species western, found only west of the 100th meridian.*

D. *Lvs. not dissected: petals yellow inside, the 2 upper madder-brown outside.*

37. **sarmentòsa,** Douglas. Prostrate plants with thickened rootstocks and numerous long leafy runners: lvs. small, roundish cordate, deep green above but often rusty beneath, closely crenate, shorter than the peduncles: fls. light yellow, the lower petal somewhat purple-veined; spur short and broad. Along the Pacific coast.

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38. **pedunculàta,** Torr. & Gray. Sts. ascending, often 2 ft. long, bearing normally in each lf.-axil as the st. develops a large (1 in. across) orange-yellow fl. on a peduncle 2–5 in. long: rootstock thick and deep: lvs. round-ovate, the base usually truncate, coarsely crenate; stipules leafy: petals purple-veined inside, the lateral ones bearded. W. Calif., where often cult.; handsome.

3946. Viola Beckwithii. (×½)

39. **glabélla,** Nutt. Sts. erect but usually weak, leafy only above: rootstock horizontal, more or less branching: lvs. cordate-reniform, glabrous or only puberulent, the lower ones on elongated petioles; stipules small: fls. bright yellow and somewhat purple-veined; lateral petals bearded; spur short and sac-like. Moist or shady places; widely distributed in the mountains of the N. W. and along the Pacific coast.

DD. *Lvs. more or less 3–9-lobed or -parted.*

40. **lobàta,** Benth. St. long and mostly naked at the base, the plant either glabrous or finely pubescent: rootstock erect: lvs. reniform to broad-cuneate, palmately cleft into 5–9 narrow lobes and the central lobe toothed: fls. yellow, the upper petals brownish purple on the outside. Calif. and S. W. Ore.

DDD. *Lvs. compoundly dissected into numerous small lobes: sts. leafy from the base.*

E. *Lateral petals beardless.*

41. **Shéltonii,** Torr. Fig. 3945 (adapted from Pacific R. R. Report). Nearly or quite glabrous: lvs. orbicular-reniform to cordate, 3-divided, the divisions 3-parted, lobed and cleft into narrow segms., not exceeding the peduncles: upper petals brownish, the 3 lower pale yellow. N. W. Colo. and N. E. Calif.

EE. *Lateral petals bearded, the 2 upper deep violet.*

42. **Béckwithii,** Torr. & Gray. Fig. 3946 (adapted from Pacific R. R. Report). Plant pubescent or puberulent: lvs. palmately about 3 times 3-parted into very narrow lobes, about equaling the peduncles: 3 lower petals pale violet, the fls. thus closely resembling those of *V. pedata.* Utah to N. E. Calif. and Ore.

43. **Hállii,** Gray. Plant glabrous; rootstock deep: lvs. 3-divided, the divisions 3–5-cleft, the segms. narrow; stipules leafy: fls. violet and yellow, the 2 upper petals dark violet and the 3 lower petals yellow or cream-colored; lateral petals bearded at base. N. W. Calif. and W. Ore.

44. **trinervàta,** Howell. Plant glabrous: ultimate segms. of the lf. lanceolate or ovate-lanceolate, tapering to an acute callous apex, thick and firm, prominently 3-ribbed: upper petals dark blue, the lower ones pale blue to whitish with a yellow base. Cent. and S. Wash.

EZRA BRAINERD.

VIOLET. One of the choicest of fragrant garden flowers. See *Viola.*

Comparatively few changes have taken place in the commercial cultivation of the violet within the past decade. The industry is more or less stabilized, and while there has been a tendency to increased planting of the single varieties, on the whole there has been no marked growth in the actual area under cultivation. The violet still offers some unique opportunities for the untrained lover of plants for the reason that it may be grown at less expense and with fewer and more simple houses and frames than almost any other of the major florist crops. While the violet readily responds to good treatment and to clean and healthy surroundings, its status is still relatively low owing to the fact that the risks of production are great, and this seems to develop a tendency toward carelessness on the part of those who take up the work as a business.

The cultivated varieties of the florist's violet are limited in number and probably all have been derived from the common sweet violet, *Viola odorata,* widely distributed over Europe and Asia. So far as known, no true varieties of the violet, either single or double, have originated in America. Of the double varieties and strains the most widely planted in this country are the Marie Louise (Fig. 3947) in its several forms, including Farquhar and Imperial; Lady Hume Campbell, Neapolitan (Fig. 3948), De Parme, Swanley White (Fig. 3949), and Madame Millet. For all practical purposes the culture of the double violet is confined to the Marie Louise, a true mauve in color, and the Campbell, a light mauve. The Neapolitan is a somewhat hardy type, but its color is too light for the market. The single varieties are coming to be important in the trade, and in the South and West are taking the place of the double sorts. South of Philadelphia, and north of Richmond, Virginia, the growing of any of the doubles is more or less risky, and it is in this territory and the Pacific coast that the singles are becoming so popular. The principal varieties are the Princess of Wales, Admiral Avellan, La France, California, and Baron Rothschild. The last is a promising variety, being a very free bloomer and a good keeper. The habit of this plant is compact and the foliage is of good texture, shape, and color.

3947. Violet, Marie Louise. (×1)

Violets will grow and thrive in almost any good garden soil. The soil that will grow good strawberries or potatoes should, with proper care, grow good violets. Under such intensive cultivation as must necessarily be given the violet, it is important to give strict attention to soil preparation. Sod from an old pasture makes excellent soil for the crop, but care should be taken that it is not too heavy. A moderately sandy loam sod is

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best. This should preferably be cut in the fall and composted with well-decomposed stable-manure. Many growers use cow-manure, but no particular advantage has been observed in this material so far as the vigor of the crop is concerned. It is more difficult to secure and is not so easily handled; hence ordinary well-decomposed stable-manure is preferred. About one part manure should be used to four parts of soil, and a little extra work in thoroughly incorporating the manure with the soil always pays well. Some of the best growers make up the heaps by bringing the soil and manure together by means of wheelbarrows and then mixing by shoveling over the pile, as is done for concrete-mixing. When there are large quantities of soil to be mixed, the hauling can of course be done with wagons or carts. A one-horse cart makes a very convenient means of bringing the materials together. Before putting the soil into the houses or frames it should be turned and mixed again and for about every two or three thousand plants use a 200-pound bag of powdered quicklime. The lime may be sprinkled on the heap from time to time as the mixing takes place.

3948. Neapolitan. (×1)

For all practical purposes the commercial cultivation of the violet is limited to growing in houses except in the South and far West, where for the most part they are grown in the open or in coldframes. There is still considerable growing done in frames, but there are so many inconveniences involved in this work that most of the frame culture has been abandoned for the cheaper forms of houses. Gradually, also, the method of growing the plants in the open field and later covering with frames is being abandoned. The violet is subject to so many diseases and troubles which are materially influenced by weather conditions that it is important to have control over at least the moisture conditions the greater part of the year. In house culture the crop is preferably grown in solid beds (Fig. 3950). Experience has shown that better and more flowers are secured by this method than by growing on benches. Then, again, there is the advantage of the long life of the solid beds and the lessened expense of the general work. Care should be taken not to have the beds too wide, otherwise it will be difficult to reach all parts of them from the walks. The best growers practise changing the soil each year. At least 5 inches of fresh soil should be put in before the young plants are set out. The time of planting varies somewhat in different parts of the country. Usually the flowers are not much in demand after the middle of April, so that in practically all the violet-growing sections preparations may begin at this time for clearing the houses and getting ready for the new crop. The plants, having been properly prepared, as will be described later, should be set 8 or 9 inches apart in rows 10 inches apart. This is the distance for the doubles. For the singles they are usually planted about 12 inches apart in the rows, the rows being from 12 to 18 inches apart. Most of the single varieties now under cultivation may be planted closer than this, say from 10 to 12 inches apart. After the plants are put out it is necessary that they should be carefully watered and all weeds in the beds kept down. It is desirable to keep the temperature as low as possible in summer. To this end the houses should be shaded. It is desirable to give plenty of fresh air, but care should be taken to have the top ventilators so arranged that the plants may be protected from rain. The violet requires considerable water, but no very rigid rules can be laid down as to the amount required. Every effort should be put forth to keep the plants in good growing condition without over-saturation of the soil. Early in summer the runners will begin to appear and these must be cut off as rapidly as the plants can be gone over conveniently. The object is to secure a good strong healthy compact plant and to induce free growth at all times, as with such strong free-growing plants developed by October 1 all the conditions will be at hand for the production of long-stemmed, good-colored flowers.

The violet may be propagated in a number of ways. One of the common practices is to divide the crown. This is usually done in spring after the flowering season is over. The plant is lifted and the soil shaken off, and then it may be readily pulled apart and the small plants either set in beds or flats. This method has objections because a great many plants or crowns so separated are hard and woody, and they will refuse to grow into good vigorous healthy crowns. A second and more desirable method is carefully to select young and vigorous offshoots and root these in the ordinary way in sand. Following the second method the young plants can be secured from time to time during the late winter without disturbing the main plants. If proper care is exercised and good selection made, another good supply of stock may be readily available early in March, and selections may be made from these for the planting, which is performed the latter part of May.

3949. Swanley. (×1)

Comparatively little attention has been given to proper houses for violet-culture. Almost any kind of house is believed to be suitable, hence the crop has not had the advantages that more favored ones like the rose and carnation have had. Any good type of well-lighted, well-ventilated house will suffice. For beginners and those who have not a large amount of capital to invest, one of the most economical and satisfactory houses is an ordinary even-span type, 12 feet wide. The height of such house from the bottom of the walk to the ridge is 7 feet. The height of the side from the top of the plate to bottom of gutter is 20 inches. The walls can be easily boarded up with rough lumber and then covered with rustic siding. One walk 14 inches wide is made through the center of the house. This gives two beds, each 5 feet 5 inches wide. Such beds are a little wide for conveniently reaching the plants from

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the walk, but by means of a board to be hooked onto the heating pipes, all plants may be conveniently reached. Coldframes for violet-culture are simple in construction. They are of the usual type, being 6 feet wide, 12 inches high in front, and 16 to 18 inches high at the back. Ordinary 3 by 6 sash may be used. These frames may be made any length in locations where the soil is porous and well drained; the frames may be lower than the surrounding soil. This gives some advantages in winter although it is back-breaking work at any time properly to care for the plants and pick the flowers in such frames.

In sections where the climate is comparatively mild, violets may be planted directly in the open ground and the frames, which may be movable ones, may be set over the plants about the middle of September. Violet houses do not need much heat, merely enough in fact to keep out the frost. The tendency is to overheat and there are probably more good crops spoiled by too much rather than too little heat. Hot water is usually depended on for heating both houses and frames. For the average houses a boiler capacity of 1,200 to 1,500 square feet will be required for every 10,000 plants. With the present cost of materials and labor it is safe to figure the cost of a plain style of house such as already described at about 50 cents a plant. A house 12 feet wide and 100 feet long will hold about 2,000 plants and should cost complete from $850 to $1,000.

Marketing is one of the most important factors connected with commercial violet-growing and is seldom understood in all its details. The grower should be thoroughly familiar with the many needs and requirements of the market and be able to supply these demands, for upon his ability to do this depends largely his success or failure from a financial standpoint. Violets are prized chiefly for their delicate perfume, and as this diminishes in proportion to the length of time they are picked, the best market, other things being equal, is the one which requires the least possible delay between picking the flowers and placing them in the hands of the customer.

The crop may be disposed of at retail or wholesale or through a commission merchant. Each method has its advantages and disadvantages, and in deciding

3950. Growing violets in solid beds.

which one to adopt the grower must be guided by existing conditions. He must in any event have a thorough knowledge of the requirements of the market as regards quality of the flowers, size, shape, and arrangement of the bunch, and should at all times exercise the utmost care in picking, packing, and shipping, so that the flowers may reach the customer in the best and most attractive condition. The kind of bunch varies from year to year, and each large city is likely to have its own style. The various styles are wonderfully exacting in their requirements and great skill is required to bunch the flowers properly.

The cultivated violets are subject to a number of diseases, each of which is characterized by one or more distinct symptoms. The principal diseases are as follows, their destructiveness being in the order in which they are discussed:

Spot disease (*Alternaria violæ*) (Fig. 3951), also called leaf-spot, leaf-rust, and smallpox, is the most widespread and destructive known in America. It attacks principally the foliage, normally producing definite circular whitish spots, frequently with concentric rings, of a darker shade, very often with a light central portion resembling the bite or sting of an insect. *Cercospora violæ*. *Phyllosticta violæ*, *Septoria violæ*, and the like, produce spots very similar in outline and appearance to those caused by *Alternaria violæ*, but only under conditions peculiarly favorable to these fungi do they cause any serious loss.

3951. Violet spot disease.

Root-rot (*Thielavia basicola*) is very troublesome and destructive in some localities, especially to young plants that are transplanted during hot dry weather. It causes the browning or blackening of the parts attacked and the final death of the plant.

Wet-rot (*Botrytis sp.*) attacks leaves, petioles, flower-stalks, and flowers, causing a moist or soft rot. It is sometimes very destructive, especially with large plants growing in a damp stagnant atmosphere, where there is insufficient ventilation and light.

Leaf-fading or yellowing is induced by a variety of conditions, but as yet little that is definite has been ascertained regarding its cause.

It is difficult to exterminate any of the diseases named after they once gain a foothold. However, they can be held in check and often entirely prevented by selecting and propagating exclusively from strong vigorous disease-resistant plants, and by keeping them in the best possible growing condition. Careful attention must be given to watering, cultivation, and ventilation, and the dead and dying leaves and all runners should be destroyed as fast as they appear.

Although violets are attacked by a number of insects and other related enemies, only a few do sufficient injury to warrant discussion here.

Aphides (*Aphis sp.* and *Rhopalosiphum violæ*) are generally known as the green and the black aphis or the green- and black-fly. They cause the young growing parts to curl and twist, resulting in a stunted ill-formed plant. They work their way into the young, unopened flower-buds, and, thrusting their bills through the overlapping petals, feed on the juice. Each puncture produces a greenish white blotch on the petal, and the flower becomes dwarfed, distorted, and worthless for market. Aphides can be easily controlled by fumigating with hydrocyanic acid gas, and this is now in general use. To each cubic foot of space in the house or frame use .15 gram of 98 per cent cyanide of potash for double varieties and .10 gram for single varieties. Handle the cyanide and gas with utmost care, as both

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are very poisonous. Divide the total amount of cyanide into as many equal parts as there are jars used, which latter should be one for every 50 to 75 lineal feet of a house 12 to 18 feet wide. Put each part into a two-pound manilla paper bag and this into a second bag. Attach each package to a string or wire so arranged as to allow it to be lowered from the outside of the house into its respective jar. Pour into each jar an amount of water about equal to the bulk of cyanide in the bag, add commercial sulfuric acid until steam is evolved, then from the outside lower the bags into the jars beneath. Fumigate double varieties thirty minutes and single varieties twenty minutes, after which open ventilators from outside, leaving them open at least sixty minutes before entering the house. Aphides may also be combated by using tobacco in some one of its many forms, but tobacco is likely to weaken the leaves and make them more liable to the attack of fungi, and on this account is very objectionable.

Red-spider (*Tetranychus telarius*) lives on the under surface of the leaves, and, when present in sufficient number, causes considerable damage. It is widely distributed on a great variety of plants, and when established in the violet-house is most difficult to combat. It can be held in check, and often the plants may be kept entirely free from it, by frequent syringing with clear water under a pressure of twenty to thirty pounds to the square inch. Care must be taken to syringe early in the morning and on bright days, so that the plants may dry off before night. Neglect may be the means of inducing disease.

Eel-worms, or nematodes, are sometimes very injurious to the violet. A common species attacks the roots, producing galls and distortions that check the growth of the plants. These may be controlled by judicious soil selection, the freezing of the soil in winter and the use of good clean grass sod. A very destructive nematode, *Aphelenchus olesistus*, that appeared in this country twelve or fifteen years ago, is rapidly becoming one of the serious enemies of the violet. This nematode attacks the crown-buds, causing the plants to "go blind." Rigid selection of stock is the only remedy. Every "blind" crown plant should be taken out and destroyed. Extreme care should be exercised in bringing in new stock. Nearly all imported plants are more or less affected with the pest. The bud nematode does more injury in this country than abroad. This may be due to the fact that while the pest has been imported, its enemies have not been brought in. Some very promising investigations are now being made by N. A. Cobb, of the Bureau of Plant Industry, United States Department of Agriculture, of a race of predaceous nematodes which destroy immense numbers of the harmful kinds.

In some parts of the country the larvæ of gall-fly (*Diplosis violicola*), violet sawfly (*Emphytus canadensis*), greenhouse leaf-tyer (*Phlyctænia rubigalis*), and several species of cutworms (*Agrotis et al.*) injure the plants to some extent by feeding on the foliage. Fumigating with hydrocyanic acid gas is the best means of combating them.

Under certain conditions slugs, snails, sowbugs, and the like, do considerable damage, especially to the flowers. They also can be controlled by the hydrocyanic acid gas treatment.

B. T. GALLOWAY.
P. H. DORSETT.

VIOLET, AFRICAN: *Saintpaulia.* **V. Damask or Dame's:** *Hesperis matronalis.* **V., Dog's-Tooth:** *Erythronium.* **V., Water:** *Hottonia.*

VIRGILIA (named for the poet Virgil). *Leguminòsæ.* Tree sometimes grown in the greenhouse: lvs. pinnately compound; lfts. small, without stipels; stipules narrow, caducous: fls. rose-purple, in short terminal racemes; calyx 2-lipped, upper 2-toothed, lower 3-toothed; petals long-clawed; standard recurved, orbicular; wings ovate, falcate, keel shorter than the wings, beaked; stamens free; ovary sessile: pod linear, plano-compressed, leathery, 2-valved. One species, S. Afr. *V. capénsis*, Lam. (*Podalýria capénsis*, Andr.). Tree: lvs. with 6–10 pairs of lfts. which are linear-oblong, mucronate, the young ones silky on both sides, the old ones glabrous and glossy above: fls. rosy purple, ½in. long; calyx silky, widely campanulate. S. Afr. B.M. 1590.

V. lùtea, Michx.=Cladrastis lutea.

VIRGINIA COWSLIP: *Mertensia virginica.* **V. Creeper:** *Parthenocissus quinquefolia.* **V. Stock:** *Malcomia.*

VIRGIN'S BOWER: *Clematis.*

VISCÀRIA: *Lychnis.*

VÍSCUM (the old Latin name used by Virgil and Pliny). *Loranthàceæ.* MISTLETOE. Parasitic shrubs which grow on trees and are well known to all on account of their use at Christmas. The lvs. are sometimes flat and rather thick, sometimes reduced to minute teeth or scales: fls. dicœcious or moncœcious at the axils or nodes: berry 1-seeded, naked or crowned with the perianth. About 70 species, natives of the temperate and warmer regions. Two species deserve mention: *V. álbum*, Linn. COMMON MISTLETOE (of Eu.). Yellowish green, glabrous shrub, 1–4 ft. high: lvs. opposite or in whorls of 3, 1–3 in. long, obovate-lanceolate, obtuse, 5–7-nerved: fr. white, nearly ½in. diam., ovoid or globose, viscid. Eu. and Temp. Asia. *V. cruciàtum*, Sieber. Resembles *V. album* in habit, foliage, and infl., but the lvs. are very pale yellow-green and 3-nerved: berries red-brown, larger and long-pedicelled. Spain, N. E. Afr., and Syria. B.M. 7828. See also *Loranthus* and *Phoradendron.*

VÍSNEA (after a Lisbon merchant). *Ternstræmiàceæ.* Evergreen tree with the habit and infl. of Eurya, sometimes grown in the warmhouse: fls. small, subsessile; sepals 5, strongly imbricated, bases somewhat connate; petals 5, imbricate, bases connate; stamens numerous, adhering to the corolla at the very base; ovary 3-celled: fr. an indehiscent berry, included in the enlarged and fleshy calyx.—One species, Canary Isls., little known in cult.

Mocanèra, Linn. f. Tender evergreen shrub, 6–9 ft. high, of compact habit and with dark green, shining leathery foliage: lvs. short-petioled, ovate-lanceolate, serrate: fls. solitary, white, pendulous. Canaries.—It is a large evergreen shrub or small tree resembling in a general way a tea plant or camellia. The specific name Mocanera was given by the younger Linnæus because the fr. was supposed to be the "mocan" of the aborigines which was made into a kind of sirup and used to a considerable extent. The fls. are only ⅜ inch across, not very numerous and much shorter than the lvs., but they are very sweet-scented. It has been offered in S. Calif.

F. TRACY HUBBARD.†

VITELLÀRIA: *Lucuma.*

VÌTEX (ancient Latin name for this or a similar shrub). *Verbenàceæ.* Ornamental woody plants chiefly grown for their white, blue, or yellowish flowers produced in terminal spikes or panicles.

Deciduous or evergreen shrubs or trees: lvs. opposite, digitate, with 3–7, rarely with 1 lft.: fls. in often panicled, few- to many-fld. cymes; calyx campanulate, usually 5-toothed; corolla tubular-funnelform, with 5-lobed, oblique and slightly 2-lipped limb; stamens 4, 2 longer and 2 shorter ones: fr. a small drupe, with a 4-celled stone.—About 60 species are known, distributed through the subtropical and tropical regions of both hemispheres, few in the temperate regions. Some species, particularly *V. altissima* and *V. leucoxylon*, in S. Asia are important timber trees.

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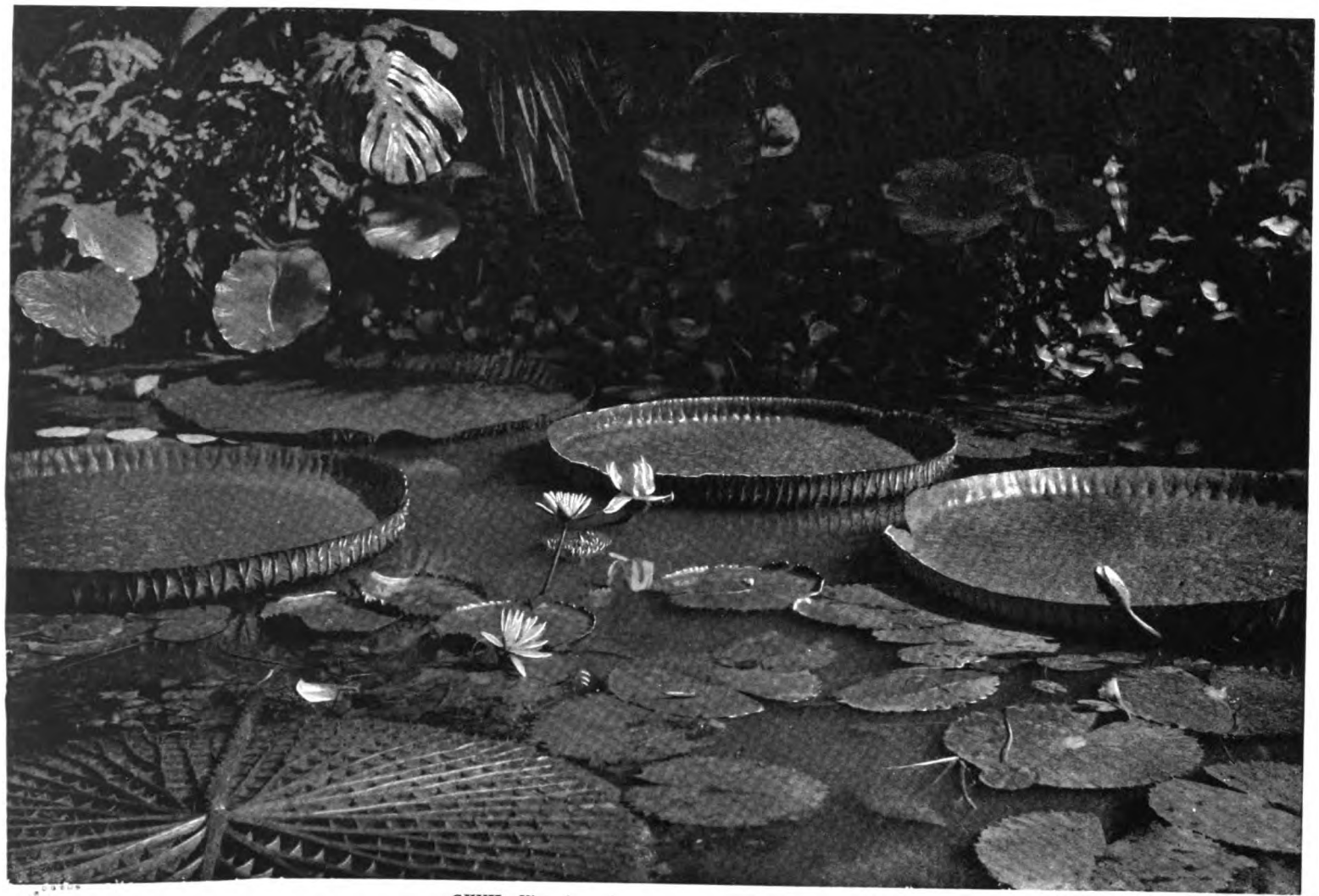

CXVII. Victoria and nymphæa in a good setting.

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The two species most often cultivated are shrubs or small trees with deciduous digitate leaves and lilac-blue or white flowers in terminal spikes or loose panicles appearing in summer and autumn. The hardiest seems to be *V. Negundo* var. *incisa*, which stands most ordinary winters as far north as Massachusetts. *V. Agnus-castus* is hardy as far north as New York, in sheltered positions. These species are particularly valuable for their late-appearing flowers. They grow in almost any kind of soil and prefer rather dry sunny situations. Most of the species are inhabitants of tropical and subtropical regions and only a few can be cultivated outdoors in warmer temperate regions. None of these tender kinds seems to be in cultivation in this country; in the Old World they are sometimes cultivated as greenhouse plants. They thrive in a sandy compost of peat and loam. Propagated by seeds sown in spring and by greenwood cuttings under glass; also by layers.

3952. Vitex Negundo var. incisa. (×⅓)

Ágnus-cástus, Linn. CHASTE-TREE. HEMP-TREE. MONK'S PEPPER-TREE. Shrub or small tree, with a strong aromatic odor, grayish tomentose: lvs. long-stalked; lfts. 5–7, lanceolate, acuminate, narrowed at the base into a short stalk, entire or with few coarse teeth, grayish-tomentose beneath, the middle one 3–4 in. long: the fls. in dense, sessile clusters, forming terminal, often panicled spikes 5–7 in. long; corolla usually pale or lilac, grayish outside, ⅓in. long; stamens and style exserted. July–Sept. S. Eu., W. Asia. Mn. 2, p. 44. G.C. III. 51:52. Var. **álba,** Rehd. (*V. albifòra*, Hort. *Ágnus-cástus vulgàris álba*, Carr.). Fls. white.

Negúndo, Linn. Shrub or small tree with quadrangular branchlets: lfts. usually 5, or occasionally 3, stalked, elliptic-ovate to lanceolate, acuminate, serrate or entire, grayish tomentulose beneath, 1½–4 in. long: fls. lilac or lavender, small, scarcely ¼in. long, stalked, in rather loose clusters forming slender spikes usually crowded into loose terminal panicles 5–8 in. long; stamens and style slightly exserted. China, India. Tender. Var. **incisa,** Clarke (*V. incìsa*, Lam. *V. laciniàta*, Hort.). Fig. 3952. Lfts. incisely serrate or almost pinnatifid, ¾–3 in. long; the more extreme form with deeply pinnatifid lfts. and narrow remote segms. may be distinguished as f. *multífida*, Rehd. (*Ágnus-cástus incìsa* var. *multífida*, Carr.). July–Aug. N. China, Mongolia. B.M. 364 (as *V. Negundo*). This variety is much hardier than the type; it is less showy in bloom than the preceding species, but a graceful shrub of loose and open habit, with handsome foliage.

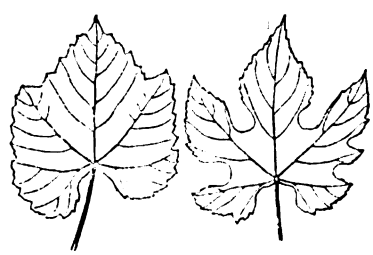
V. iliciflòlia, A. Rich. Lvs. simple, short-stalked, oval, spiny-toothed: fls. in long-stalked, axillary, many-fld. cymes. Cuba.—*V. Lindenii*, Hook. f. Lfts. 3–5, elliptic or elliptic-obovate, glabrous: fls. pale violet, in few-fld., axillary, long-stalked heads. Colombia. B.M. 6230.—*V. lùcens*, T. Kirk (V. littoralis, A. Cunn.). Tree, to 60 ft., producing valuable hardwood: lvs. long-stalked; lfts. 3–5, elliptic, almost acuminate, glabrous: fls. in axillary panicles, abundant, dull red, 2-lipped. New Zeal.—*V. trifòlia*, Linn. Lfts. usually 3, obovate or obovate-oblong, obtuse, entire: fls. blue, in terminal panicles. S. Asia. Polynesia. Var. *unifoliolàta*, Schauer. With a solitary short-stalked lft.

ALFRED REHDER.

VÍTIS (classical Latin name). VINE. GRAPE. *Vitàceæ* or *Ampelídeæ*. Tendril-climbers (some members of the genus Cissus erect) grown as ornamental vines but particularly for the edible fruits or grapes.

The genus is variously defined, but if Cissus is excluded it is distinguished as follows (Gray): Plants climbing by the prehension and coiling of naked-tipped tendrils: fls. polygamo-dicœcious (i. e., some individuals perfect and fertile, others sterile with at most only a rudimentary ovary), 5-merous; corolla calyptrately caducous—the petals in anthesis cast off from the base while cohering by their tips (Fig. 3954); hypogynous disk of 5 nectariferous glands alternate with stamens; style short and thick, or conical: berry pulpy; seeds pyriform, with contracted beak-like base.—A widespread genus of the northern hemisphere, most abundant in temperate countries. In its stricter limitations, the genus includes less than 60 known species, but some authors unite Cissus and Ampelopsis with it, when it includes some 250 species. The standard monographer (Planchon, DC. Monogr. Phaner. 5), refers 30 or more species to Vitis in the main account and in the addendum, and more than 200 to Cissus. N. Amer. is particularly rich in Vitis, not only in number of species but in the widespread distribution and the abundance of the plants. From the native species have been developed the outdoor grapes of this country except those of Calif. and the extreme S. W. (which are *Vitis vinifera*). For an account of the evolution of these native cultural varieties, see Bailey, Sketch of the Evolution of Our Native Fruits; Hedrick's Grapes of New York, a notable volume issued by the N. Y. Agric. Exp. Sta.; also Munson, Foundations of American Grape Culture, 1909. For a sketch of Vitis and similar plants as ornamental vines, with illustrations, see Veitch, Journ. Roy. Hort. Soc. 28 (1903–4). For cult., and control of insects and diseases, see *Grape*. For recent studies in lf. variation and in pollen sterility, see M. J. Dorsey, Proc. Amer. Breeders' Assoc., vol. 7 (1912), and Bull. No. 144, Minn. Exp. Sta. (1914).

Many of the species of Vitis are excellent ornamental plants, when it is desired to cover arbors, porches, or trees; a number of the recently introduced oriental



3953. Vitis.—Forms of leaf on the same vine.

species (some of them properly referable to Ampelopsis and Parthenocissus) seem to be particularly interesting for such use. All of them are readily grown from seeds, and most of them from hardwood cuttings. Only a few of the native species are regularly in the trade; but with the possible exception of *V. Treleasei* they have been offered for sale to experiment stations and amateurs by the late T. V. Munson, of Texas, a well-known authority on both the botany and horticulture

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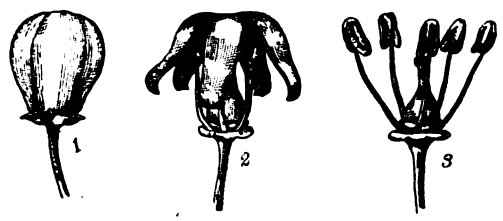
of the grape. The popular interest in these species is primarily pomological; for, although the fruit may not be directly useful, the species give promise of development through hybridization and plant-breeding, and some of them afford useful stocks on which to graft kinds that do not resist the phylloxera or root-louse. The following discussion includes all the species native



3954. Grape flowers, enlarged. *1*, shows the bud; *2*, shows the petals or "cap" falling; *3*, shows the flower in full bloom, the petals having been cast off. In all the flowers the minute calyx is seen, and in *2* and *3* the disk is shown inside the base of the stamens.

to North America north of Mexico; it is adapted from the writer's account in Gray's "Synoptical Flora," vol. 1, 420–430. These American grapes are very difficult to distinguish in many cases; hence the subjoined descriptions are full, to bring out the contrasting characters. Some of the best recent systematic writing on American Vitis is from French sources, since the American species have come into prominence in France as phylloxera-resisting stocks for the wine grape. See, for example, the works of Millardet, and Viala and Ravaz; also "Ampélographie Universelle," by Viala and Vermorel. Many of the species listed in the trade under Vitis will be found in the genera Ampelopsis, Parthenocissus, and Cissus.

The grape-vines of eastern Asia, although apparently not yielding fruit of value, are interesting as ornamental vines, and some of them are likely to come into prominence for their good foliage and brilliant autumn coloring. They are little known with us as yet. *V. Coignetiæ* and *V. amurensis* are hardy in the northern states. Those tender at the Arnold Arboretum and more or less killed back in winter are *V. Davidii*, *V. flexuosa*, *V. Romanetii*, *V. pulchra*, *V. reticulata*, *V. Piasezkii*, and *V. pentagona*.

Vitis species are of easy culture for ornament, and probably all of them propagate by hardwood cuttings, although layering may be easier with some species. Even species that are tender in any locality often make very attractive new growths each year if the roots are not injured. Attention must be given to fungous diseases.

In southern California and other southern parts, a number of evergreen species now attain more or less prominence, particularly "the evergreen grape-vine" or *V. capensis*. These plants are mostly species of Cissus (which see, page 775), which is separated from Vitis by the mostly four-merous flowers with separate expanding petals and different disk, the plants often fleshy and sometimes erect rather than climbing. The evergreen set in cultivation more or less prominently in this country comprises *Cissus antarctica* (*V. Baudiniana*), page 776; *C. capensis* (*V. capensis*); *C. gongylodes* (*V. pterophora*), page 776; *C. hypoglauca* (*V. hypoglauca*); *C. oblonga* (*V. oblonga*); *C. quadrangularis* (*V. quadrangularis*); *C. rhombifolia* (*V. rhombifolia*); *Vitis Romanetii* (*V. rutilans*); *Cissus striata* (*V. semperviren*s), page 776. The standard English authorities combine Cissus and Vitis, but continental as well as American authors incline to keep them distinct. Several of the species properly referred to Cissus are described in the present account (Nos. 1–5), not having found their place regularly under Cissus in Vol. II.

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I. *Species of Cissus grown under the name of Vitis, to be added to those described on pages 775 and 776, Vol. II.*

A. *Plant fleshy, with winged sts.*

1. **C. quadrangulàris,** Planch. (*Vitis quadrangulàris*, Linn.). An odd succulent with 4-winged sts. much constricted at the nodes, climbing, mostly glabrous, often nearly leafless, looking like a spineless cereus: lvs. varying from ovate and not lobed to cordate or reniform and deeply 3-lobed, the middle part sometimes lobed, the sinuses open and rounded, margins denticulate: fls. in small short-peduncled compound lateral cymes, the calyx 1 line long, the petals 4 and greenish; stamens 4, with short filaments: berries nearly globose, red, 1-seeded, size of pea, acrid. Trop. Afr., Arabia, India, Moluccas.—Sts. said to be eaten by natives in Ceylon.

AA. *Plant little or not at all fleshy: sts. sometimes angled but not winged.*

2. **C. capénsis,** Willd. (*Vitis capénsis*, Thunb. *Rhoicissus capénsis*, Planch.). Fig. 3955. EVERGREEN GRAPE-VINE of southern Calif., now much planted there: strong climbing vine, with globular ground tubers to 6 or 8 in. diam., terete striate sts. and young parts reddish hairy: lvs. long-stalked, simple, thickish,

3955. Vitis capensis (preferably known as Cissus capensis), an evergreen species prized in southern California. (×½)

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nearly orbicular to reniform, 3-nerved, obtusely 5-angled, the margin repand-dentate, with ovate stipules: infl. thyrse-like, tomentose, with long peduncles, the fls. woolly, with 5 triangular-ovate petals and 5 stamens, the ovary hirsute and style short: fr. globular, red-black and glossy, usually 2-seeded, about ½in. diam., said to be excellent for sirups, jellies, and for stewing. S. Afr.—Tubers reported as making wholesome fodder for cattle.

3. **C. hypoglaûca,** Gray (*Vìtis hypoglaùca*, Muell.). Foliage handsome and persistent, dark green above and glaucous beneath; lfts. usually 5, obovate to elliptic, acuminate, stalked, entire or toothed toward the apex: fls. yellowish: fr. nearly globular. Austral.

4. **C. rhombifòlia,** Planch. (*Vìtis rhombifòlia*, Vahl). Scandent evergreen, the branches angled but not winged: lvs. 3-foliolate, petioled; lfts. all long-petiolulate, serrate, glabrous above, the lateral ones oblique and somewhat cordate, the middle one ovate to rhomb-ovate: fls. many in lf.-opposed clusters, the calyx and petals pubescent. W. Indies, S. Amer.

5. **C. oblónga,** Planch. (*Vìtis oblónga*, Benth.). Erect tree-like evergreen species, the branches with a few tendrils, glabrous or the young shoots minutely tomentose: lvs. simple, broad-oblong to ovate-oblong, obtuse, about 1–2 in. long, entire, obscurely 3-nerved: fr. ovoid, small, 1–2-seeded, in short-peduncled cymes. Austral.—Allied to *C. antarctica*.

II. *Species of Vitis, or true grapes: plants yielding the grapes of commerce, but some of them grown for arbors and for ornament.*

A. *Bark bearing prominent lenticels, never shredding: nodes without diaphragms: tendrils simple: fl.-clusters small and not much elongated: seeds oval or oblong, without a distinct stipe-like beak. (Muscadínia; separated as a genus by Small.)*
B. *Berries large (½in. or more diam.), musky-tasted: lvs. firm or dense in texture, prominently pointed*..... 6. **rotundifolia**
BB. *Berries half smaller, acid: lvs. thin, not prominently pointed*..... 7. **Munsoniana**
AA. *Bark without distinct lenticels, on the old wood separating in long thin strips and fibers: nodes provided with diaphragms: tendrils forked: fl.-clusters mostly large and elongated: seeds pyriform. (Euvitis.)*
B. *The wine-grape, grown extensively in Calif. as well as in Eu., and also in glass graperies: skin and pulp mostly firmly adhering in the ripe fr.* 8. **vinifera**
BB. *The grapes of more modern domestication or intro. representing the commercial kinds in N. Amer. outside the Calif. region, and exotic species grown for ornament: skin of the mature berry usually separating freely from the pulp.*
C. *Sts. stiff-hairy or bristly, or prickly. (Spinovitis.)*
D. *Lvs. becoming glabrous beneath: sts. glabrous and prickly*..... 9. **Davidii**
DD. *Lvs. floccose or loosely pubescent beneath: sts. glandular-bristly and pubescent*.....10. **Romanetii**
CC. *Sts. glabrous or pubescent, not aculeate or armed.*
D. *Vitis species of N. Amer., some of them giving rise to pomological races and the others of botanical interest. (Nos. 11–32).*
E. *Class of green-lvd. grapes, mostly marked at maturity by absence of prominent white, rusty, or blue tomentum or scurf or conspicuous bloom on the lvs. beneath (under surface sometimes thinly pubescent, or minute patches of floccose wool in the axils of the veins, or perhaps even cobwebby): foliage mostly thin: tendrils intermittent, i. e., every third joint bearing no tendrils (or infl.). V. cinerea and V. arizonica are partial exceptions and might be looked for in* EE *(Nos. 11–25).*
F. *Group of vulpina-like grapes, characterized by thin light or bright green mostly glossy lvs. (which are generally glabrous below at maturity except perhaps in the axils of the veins and in V. Champinii, with a long or at least a prominent point and usually long and large sharp teeth or the edges even jagged.*
G. *Lvs. broader than long, with truncate-oblique base. (V. Treleasei might be sought here.)*.....11 **rupestris**
GG. *Lvs. ovate in outline, with a mostly well-marked basal sinus.*
H. *Diaphragm (in the nodes) thin: young shoots not red: lvs. not deeply lobed.*
I. *Lf.-margin not lobed or only obscurely so, the teeth small or else not elongated*.....12. **monticola**
13. **Champinii**
II. *Lf.-margin tending to be prominently lobed above, the teeth usually long.*
J. *Young parts pubescent or floccose*.....14. **Longii**
JJ. *Young parts nearly or quite glabrous.*
K. *Tendrils prominent and persisting*.....15. **vulpina**
KK. *Tendrils small and deciduous*.....16. **Treleasei**
HH. *Diaphragm very thick and strong: young shoots bright red: lvs. often strongly lobed.*17. **rubra**
FF. *Group of cordifolia-like grapes, with thickish and dull-colored or grayish green lvs. often holding some close dull pubescence below at maturity and the shoots and lvs. nearly always more or less pubescent when young, the teeth mostly short, the point mostly rectangular and conspicuous.*
G. *Plant strong and climbing, with stout persistent tendrils.*
H. *Young shoots terete or slender, and glabrous or very soon becoming so*.....18. **cordifolia**
HH. *Young shoots angled, and covered the first year with tomentum or wool.*
I. *Under surface of lvs. glabrous or essentially so at maturity.*
J. *Blade of lf. lustrous or glossy when full grown*.....19. **Berlandieri**
JJ. *Blade of lf. dull*.....20. **Baileyana**
II. *Under surface of lvs. grayish pubescent*.....21. **cinerea**
GG. *Plant scarcely climbing, the tendrils perishing when failing to find support*.....22. **arizonica**
FFF. *Group of orbicular-scallop-lvd. species of the Pacific coast*.....23. **californica**
EE. *Class of colored-lvd. grapes, marked by thick or at least firm foliage, the lvs. prominently rusty or white-tomentose or glaucous-blue. V. cinerea, V. arizonica, and possibly V. californica might be sought here; and late-gathered forms of V. bicolor might be looked for in* E.

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F. *Lvs. only flocculent or cobwebby or glaucous below when fully grown (i. e. not covered with a thick, dense, felt-like tomentum, except sometimes in V. Doaniana).*
G. *Ends of the growing shoots and the under surface of the lvs. whitish or gray: the white-tipped grapes.*
H. *Grape of S. Calif., with thick diaphragms and short-pointed lvs.* ..... 24. **Girdiana**
HH. *Grape of Okla.-Texas region, with thin diaphragms and prominently pointed lvs.* ..... 25. **Doaniana**
GG. *Ends of shoots (except in V. bicolor), and the unfolding lvs. distinctly rusty-colored, and the mature lvs. either rusty or bluish beneath (or sometimes becoming green in V. bicolor): the æstivalian grapes.*
H. *Growths usually prominently floccose or tomentose* ..... 26. **caribæa**
HH. *Growths pubescent or becoming nearly or quite glabrous.*
I. *Under surface of lvs. mostly glaucous-blue* ..... 27. **bicolor**
II. *Under surface not glaucous-blue (except in variety of No. 29).*
J. *Berries small, ½in. or less through: eastern* ..... 28. **æstivalis**
JJ. *Berries larger: western* ..... 29. **Linsecomii**
FF. *Lvs. densely tomentose or felt-like beneath throughout the season, the covering white or rusty white.*
G. *Tendrils intermittent (every third joint lacking tendril or fl.-cluster).*
H. *Tomentum on under surface of lvs. white* ..... 30. **candicans**
HH. *Tomentum on under surface rusty* ..... 31. **Simpsonii**
GG. *Tendrils continuous (at every node a tendril or fl.-cluster)* ..... 32. **Labrusca**
DD. *Vitis species of E. Asia, somewhat intro. for ornament, mostly recently, and as yet little known in this country: mostly with lf.-resemblance to N. American species.*
E. *Lvs. divided or compound on some of the shoots* ..... 33. **Piasezkii**
EE. *Lvs. undivided or variously lobed.*
F. *Sts. glabrous at maturity* ..... 34. **reticulata**
35. **flexuosa**
FF. *Sts. pubescent, tomentose, or floccose.*
G. *Lobes of lvs. usually manifest* ..... 36. **amurensis**
37. **Thunbergii**
GG. *Lobes of lvs. wanting or not marked.*
H. *Base of lf. truncate or only obscurely cordate* ..... 38. **pentagona**
39. **pulchra**
HH. *Base of lf. cordate* ..... 40. **Coignetiæ**
41. **lanata**

6. **rotundifòlia**, Michx. (*V. muscadìna, V. angulàta, V. verrucòsa, V. peltàta, Muscadìnia rotundifòlia*, Small). MUSCADINE. SOUTHERN FOX GRAPE. BULLACE, BULLIT, or BULL GRAPE. Fig. 1708, Vol. III. Vine with hard warty wood, running even 60–100 ft. over bushes and trees, in the shade often sending down dichotomous aërial roots: lvs. rather small to medium (2–6 in. long), dense in texture and glabrous both sides (sometimes pubescent along the veins beneath), cordate-ovate and not lobed, mostly with a prominent and sometimes an acuminate point (but somewhat contracted above the termination of the 2 main side veins), the under surface finely reticulated between the veins, the teeth and the apex angular, coarse and acute, the basal sinus shallow, broad and edentate; petiole slender and (like the young growth) fine-scurfy, about the length of the lf.-blade: tendrils (or fl.-clusters) discontinuous, every third node being bare: fr.-bearing clusters smaller than the sterile ones, and ripening from 3–20 grapes in a nearly globular bunch: berries falling from the clusters when ripe, spherical or nearly so and large (½–1 in. diam.), with very thick and tough skin and a tough musky flesh, dull purple in color without bloom (in the Scuppernong variety silvery amber-green), ripe in summer and early autumn; seeds ¼–⅜in. long, shaped something like a coffee berry. River banks, swamps, and rich woodlands and thickets, S. Del. to N. Fla. and west to Mo., Kans., Texas, and Mex. For a recent pomological account of the Muscadine grapes, see Husmann, Farmers' Bull. No. 709, U. S. Dept. Agric. (1916); for a treatise on Muscadine grape-sirup, consult Dearing, Farmers' Bull. No. 758 (1916).

3956. Vitis vinifera. (×¼)

7. **Munsoniàna**, Simpson (*Muscadìnia Munsoniàna*, Small). MUSTANG GRAPE of Fla. BIRD, EVERBEARING, or EVERLASTING GRAPE. Very slender grower, preferring to run on the ground or over low bushes, more nearly evergreen than the last, flowering more or less continuously: lvs. smaller, thinner, and more shining, more nearly circular in outline and less prominently pointed, the teeth broader in proportion to the blade and more open or spreading: clusters larger and more thyrse-like: berries a half smaller than in the last and often more numerous, shining black, with a more tender pulp, acid juice, no muskiness, and thinner skin; seeds half smaller than in the last. Dry woods and sands, Fla. at Jacksonville, Lake City, and southward, apparently the only grape on the reef keys; also in the Bahamas.—Difficult to distinguish from *V. rotundifolia* in herbarium specimens, but distinct in the field. The plant often bears fls. and both green and ripe fr. into Dec.

8. **vinifera**, Linn. WINE GRAPE. EUROPEAN GRAPE. Fig. 3956. Young growth smooth or floccose, the plant

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not so high-climbing as most American species: tendrils intermittent: lvs. mostly thinnish, rounded, with a deep sinus and the basal lobes usually overlapping, tomentose or glabrous beneath, the margins coarsely notched or jagged: clusters large and long, the berries usually oval or oblong, although many varieties are globular-fruited. Probably native to the Caspian or Caucasus region and W. India. Cult. from the earliest times, and the grape of history; now greatly varied. The hothouse grapes, as Black Hamburg, Barbarossa, are of this species; also the vineyard grapes of Calif. Not hardy in the northern states and very subject to phylloxera (root-louse) and mildew. Regel, a Russian botanist, considered the wine grape to be a hybrid of 2 species that he characterized as *V. Labrusca* and *V. vulpina*, but this view is not accepted. Var. **apiifòlia**, Loud. (*V. laciniòsa*, Linn. *V. vinífera* var. *laciniòsa*, Dipp.), has the lvs. cut into 5 much-cleft segms: ornamental: known as "parsley vine," and "ciotat." Gn. 54, p. 425.

9. **Dàvidii**, Föex (*Spinovítis Dàvidii*, Romanet. *Vítis Davidiàna*, Dipp. *V. armàta*, Diels & Gilg. *V. vinífera* var. *Dàvidii*, Hort.). Sts. and petioles armed with straight or slightly recurved prickles, glabrous: tendrils interrupted: lvs. long-petioled, large, paper-like, somewhat glaucous and becoming glabrous beneath, broadly ovate, obscurely angled, the base cordate, the apex acuminate and acute, the margin lightly repand-apiculate-serrate: thyrse peduncled, long-conical, usually surpassing the lf., the fls. very early: fr. rather large, globose, black. China.—Old branches prickly.

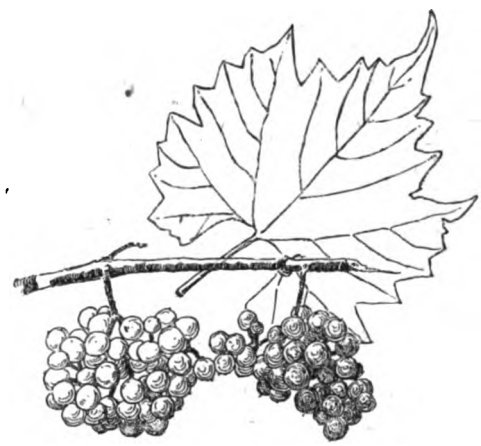
Var. **cyanocárpa**, Sarg. (*V. armàta* var. *cyanocárpa*, Gagnep. *V. armàta* var. *Veìtchii*, Hort.). Less prickly, the growing shoots bare: fr. bluish: perhaps a hybrid. China.

10. **Romanétii**, Romanet (*V. rùtilans*, Carr.). Petioles and young sts. floccose-pubescent and bearing spreading gland-bearing purplish hairs or bristles; sts. becoming nearly glabrous the second year: tendrils interrupted: lvs. large, cordate-orbicular and obscurely angled-3-lobed, coarsely crenate-dentate, at maturity nearly or quite glabrous above, below more or less floccose-pubescent at least on the nerves: thyrse peduncled, elongated-conical, surpassing the lvs.: fr. black, edible, the seeds globose-ovoid. China. R.H. 1890:444.

11. **rupéstris**, Scheele. Sand, Sugar, Rock, Bush, Currant, or Mountain Grape. Shrub, 2–6 ft. high, or sometimes slightly climbing, the tendrils few or even none, diaphragms plane and rather thin: lvs. reniform to reniform-ovate (about 3–4 in. wide and two-thirds as long), rather thick, smooth and glabrous on both surfaces at maturity, marked by a characteristic light glaucescent tint, the sides turned up so as to expose much of the under surface, the base only rarely cut into a well-marked sinus, the margins very coarsely angle-toothed, the boldly rounded top bearing a short, abrupt point and sometimes 2 lateral teeth enlarged and suggesting lobes: stamens in fertile fls. recurved laterally or rarely ascending, those in the sterile fls. ascending: cluster small, slender, open and branched: berries small (¼–½ in. diam.), purple-black and somewhat glaucous, pleasant-tasted, ripe in late summer; seeds small and broad. Sandy banks, low hills, and mountains, S. Pa. to Tenn., Ind., Mo., Okla., and S. W. Texas. Var. **dissécta**, Eggert, is a form with more ovate lvs. and very long teeth, and a strong tendency toward irregular lobing. Mo.

12. **monticola**, Buckl. (*V. texàna*, Munson. *V. Foexedna*, Planch). Sweet Mountain Grape. Fig. 3957. A slender trailing or climbing plant (reaching 20–30 ft. in height, with very long and slender branches, the young growth angled and floccose (sometimes glabrous), the diaphragms plane and rather thin: lvs. small and thin (rarely reaching 4 in. in width and generally from 2–3 in. high), cordate-ovate to triangular-ovate, with the basal sinus ranging from nearly truncate oblique to normally inverted U-shaped, rather dark green but glossy above and grayish green below, when young more or less pubescent or even arachnoid below, the blade either prominently notched on either upper margin or almost lobed, the point acute and often prolonged, margins irregularly notched with smaller teeth than in *V. rupestris:* clusters short and broad, much branched: berries medium or small (averaging about ½in. diam.), black or light-colored, seedy, sweet; seeds large (about ¼in. long) and broad. Limestone hills in S. W. Texas.—This species has been the subject of much misunderstanding.

13. **Champinii**, Planch. Probably a hybrid of *V. rupestris* or *V. Berlandieri* and *V. candicans*, bearing medium to large reniform or reniform-cordate lvs. which are variously pubescent or cobwebby but become glabrous, the growing tips mostly white-tomentose: berries very large and excellent. S. W. Texas. A.G. 12:579.—In some places associated with *V. candicans*, *V. Berlandieri*, and *V. monticola* only, and in others with the above and *V. rupestris*. Often composing dense thickets in the wild.



3957. Vitis monticola. (×½)

14. **Lóngii**, Prince (*V. Solònis*, Planch. *V. nuèvo-mexicàna*, Lemm.). Differs from vigorous forms of *V. vulpina* in having floccose or pubescent young growth: lvs. decidedly more circular in outline, with more angular teeth and duller in color, often distinctly pubescent beneath: stamens in fertile fls. short and weak and laterally reflexed, those in sterile fls. long and strong: seeds larger. W. Okla., N. W. Texas, New Mex. and S. Colo.—Regarded by French authors as a hybrid, the species *V. rupestris*, *V. vulpina*, *V. candicans*, and *V. cordifolia* having been suggested as its probable parents; but Munson thinks that it has "a well-characterized specific make-up of its own." It is variable in character. In most of its forms it would be taken for a compound of *V. rupestris* and *V. vulpina*, but the latter species is not known to occur in most of its range. It was very likely originally a hybrid between *V. rupestris* (which it sometimes closely resembles in herbarium specimens except for its woolliness) and some tomentose species (possibly with *V. arizonica* or *V. Doaniana*), but it is now so widely distributed and grows so far removed from its supposed parents and occurs in such great quantity in certain areas, that for taxonomic purposes it must be kept distinct. It is not unlikely that it has originated at different places as the product of unlike hybridizations. Late French writers designate the jagged-lvd. forms as *V. Solonis*, and the dentate forms as *V. nuevo-mexicana*. This interesting grape was

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found about fifty years ago by Engelmann in the Botanic Garden of Berlin under the name of *Vitis Solonis*, without history. Engelmann guesses (Bush-berg Cat. ed. 3, 18) the name to be a corruption of "Long's." It is probable that the plant was sent to European gardens as *Vitis Longii*—very likely from Prince's nursery—and the name was misread on the label. The original name, which was duly published by Prince with description, may now be restored.

Var. **microspérma,** Bailey (*V. Solònis* var. *microspérma*, Munson), is a very vigorous and small-seeded form, which is very resistant to drought. Red River, N. Texas.

15. **vulpìna,** Linn. (*V. ripària*, Michx. *V. odoratissima*, Donn. *V. odoràta*, Hort. *V. illinoénsis* and *V. missouriénsis*, Prince? *V. cordifòlia* var. *ripària*, Gray). Riverbank or Frost Grape. Fig. 3958. A vigorous tall-climbing plant, with a bright green cast to the foliage, normally glabrous young shoots, large stipules, and plane very thin diaphragms: lvs. thin, medium to large, cordate-ovate, with a broad but usually an evident sinus, mostly showing a tendency (which is sometimes pronounced) to 3 lobes, generally glabrous and bright green below, but the veins and their angles often pubescent, the margins variously deeply and irregularly toothed and sometimes cut, the teeth and the long point prominently acute: fertile fls. bearing reclining or curved stamens, and the sterile ones long and erect or ascending stamens: clusters medium to large, on short peduncles, branched (often very compound), the fls. sweet-scented: berries small (less than ½in. diam.), purple-black with a heavy blue bloom, sour and usually austere, generally ripening late (even after frost); seeds rather small and distinctly pyriform. Nova Scotia and New Bruns. to Man., Kans., and Colo. and south to W. Va., Mo. and Texas. B.M. 2429. —The commonest grape in the northern states west of New England, abundant along streams. Variable in the flavor and maturity of the fr. Forms with petioles and under surfaces of lvs. pubescent sometimes occur. It apparently hybridizes with *V. Labrusca* eastward, the hybrid being known by the tomentose young shoots and unfolding lvs., and the darker foliage, which is marked with rusty tomentum along the veins of the less jagged lvs.

3958. Vitis vulpina. (×½)

3959. Vitis rubra form (×⅕)

Var. **præcox,** Bailey, is the June Grape of Mo., the little sweet frs. ripening in July.

16. **Treleàsei,** Munson. Plant shrubby and much branched, climbing little, the small and mostly short (generally shorter than the lvs.) tendrils deciduous the first year unless finding support, internodes short, the diaphragms twice thicker (about ⅛in.) than in *V. vulpina* and shallow-biconcave: stipules less than one-fourth as large as in *V. vulpina:* lvs. large and green, very broad-ovate or even reniform-ovate (often wider than long), thin, glabrous and shining on both surfaces, the basal sinus very broad and open and making no distinct angle with the petiole, the margin unequally notch-toothed (not jagged as in *V. vulpina*) and indistinctly 3-lobed, the apex much shorter than in *V. vulpina:* fertile fls. with very short, recurved stamens, sterile with ascending stamens: cluster small (2–3 in. long): berries ⅓in. or less thick, black with a thin bloom, ripening 3 weeks later than *V. vulpina* when grown in the same place, thin-skinned; pulp juicy and sweet; seeds small. Brewster Co., S. W. Texas and New Mex. to Bradshaw Mts., Ariz.—Little known, and possibly a dry-country form of *V. vulpina.* In habit it suggests *V. arizonica* var. *glabra,* from which it is distinguished, among other things, by its earlier flowering and larger lvs. with coarser teeth and less pointed apex.

17. **rùbra,** Michx. (*V. monospérma*, Michx.). Red or Cat Grape. Fig. 3959. A slender but strong-growing vine, with small long-jointed angled red glabrous herb-like shoots and red petioles: lvs. small to medium, ovate-acuminate, dark green and glossy, sometimes indistinctly pubescent on the nerves below, the sinus obtuse, the blade either nearly continuous in outline or (commonly) prominently lobed or even parted, coarsely notched: stamens in the sterile fls. long and erect: clusters loose and long-peduncled, branched, the fls. opening very late: berries small and late (¼–⅜ in. diam.),

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black without bloom, with little juice and commonly containing but a single seed, which is large and broad. Ill. and Mo. to Texas; known mostly along the Wabash River and along the Mississippi in the latitude of St. Louis. G.F. 2:341 (repeated in Fig. 3959).—A handsome plant. *V. palmata*, Vahl, founded on Virginian specimens, is probably *V. vulpina*, although it is sometimes made to replace the name *V. rubra*.

18. **cordifòlia**, Michx. TRUE FROST GRAPE. CHICKEN, RACCOON, or WINTER GRAPE. One of the most vigorous of American vines, climbing to the tops of the tallest trees, and sometimes making a trunk 1–2 ft. diam.: diaphragms thick and strong: lvs. long-cordate, triangular-cordate with rounded base, or cordate-ovate, undivided but sometimes very indistinctly 3-lobed or 3-angled, the basal sinus rather deep and narrow, the margin with large acute teeth of different sizes and the point long and acute, the upper surface glossy and the lower bright green and either becoming perfectly glabrous or bearing a little close and fine inconspicuous grayish pubescence on the veins; petioles long: stamens erect in the sterile fls. and short reflexed-curved in the fertile ones: clusters long and very many-flowered, most of the pedicels branched or at least bearing a cluster of fls.: berries numerous and small (about ⅜in. diam.), in a loose bunch, black and only very slightly glaucous, late and persistent, with a thick skin and little pulp, becoming edible after frost; seeds medium and broad. In thickets and along streams from Pa. (and probably S. N. Y.) to E. Kans., Fla., and Texas.

Var. **fœtida**, Engelm., has fetidly aromatic berries, and grows in the Mississippi Valley.

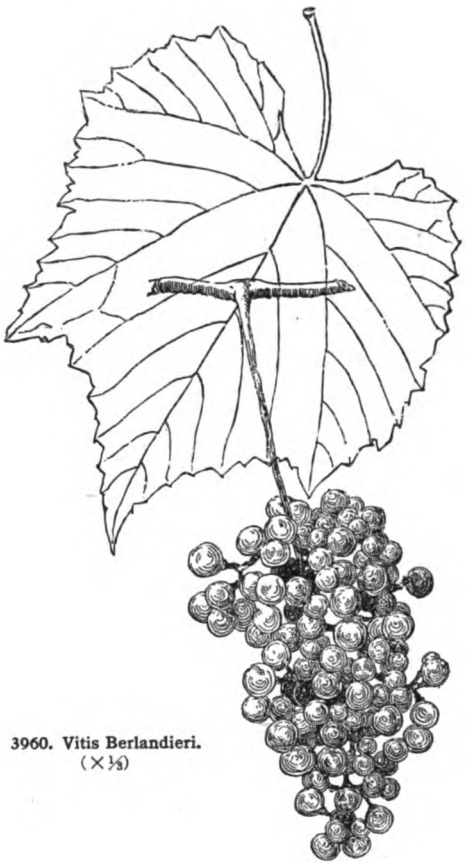
Var. **sempérvirens**, Munson. A glossy-lvd. form holding its foliage very late: lvs. sometimes suggesting forms of *V. rubra*, deltoid with a truncate base: clusters small, the fr. ripening later than in the type. S. Fla.

Var. **Hélleri**, Bailey (*V. Hélleri*, Small). Lvs. more circular (i. e., lacking the long point), and the teeth round-obtuse and ending in a short mucro. Kerr Co., S. Texas, 1,600–2,000 ft.

19. **Berlandièri**, Planch. MOUNTAIN, SPANISH, FALL, or WINTER GRAPE. Fig. 3960. A stocky moderately climbing vine, with mostly short internodes and rather thick diaphragms: lvs. medium large, broadly cordate-ovate or cordate-orbicular (frequently as broad as long), glabrous and glossy above, covered at first with gray pubescence below but becoming glabrous and even glossy except on the veins, the sinus mostly inverted-U-shaped in outline but often acute at the point of insertion of the petiole, the margin distinctly angled above or shortly 3-lobed and marked by rather large, open, notch-like acute teeth of varying size, the apex mostly pronounced and triangular-pointed: stamens long and ascending in the sterile fls., laterally recurved in the fertile ones: clusters compact and compound, mostly strongly shouldered, bearing numerous medium to small (½in. or less diam.), purple and slightly glaucous very late berries which are juicy and pleasant-tasted; seed (frequently only 1) medium to small. Limestone soils along streams and hills, S. W. Texas and Mex.—Well marked by the gray-veined under surface of the lvs.

20. **Baileyàna**, Munson. 'POSSUM GRAPE. Less vigorous climber than *V. cordifolia*, rather slender, with short internodes and very many short side shoots: lvs. frequently smaller, the larger ones shortly but distinctly 3-lobed (lobes mostly pointed and much spreading), bright green but not shining above, gray below and pubescent at maturity only on the veins, the point only rarely prolonged and often muticous, the teeth comparatively small and notch-like and not prominently acute, sinus more open; petioles shorter and often pubescent: floral organs very small, the stamens reflexed in the fertile fls.: pedicels short, making the bunch very compact: berries about the size of *V. cordifolia*, black and nearly or quite bloomless, late; seed small and notched on top. Mountain valleys, 800–3,000 ft. altitude, S. W. Va. and adjacent W. Va. and W. N. C., Tenn., and N. Ga.; also at common levels in the uplands of W. Cent. Ga.—The eastern counterpart of *V. Berlandieri*.

21. **cinèrea**, Engelm. SWEET WINTER GRAPE. Fig. 3961. Climbing high, with medium to long internodes and thick and strong diaphragms: lvs. large, broadly cordate-ovate to triangular-cordate-ovate (generally longer than broad), the sinus mostly wide and obtuse,



3960. Vitis Berlandieri. (×⅓)

the margin small-notched (teeth much smaller than in *V. Berlandieri*) or sometimes almost entire, mostly distinctly and divaricately 3-angled or shortly 3-lobed toward the apex, the triangular apex large and prominent, the upper surface cobwebby when young but becoming dull dark green (not glossy), the under surface remaining ash-gray or dun-gray, webby-pubescent: stamens in sterile fls. long, slender, and ascending, in the fertile ones short and laterally recurved: cluster mostly loose and often straggling, containing many small black berries, these only slightly, if at all glaucous, ripening very late, and after frost becoming sweet and pleasant; seeds small to medium. Along streams, mostly in limy soils, Cent. Ill. to Kans. and Texas; also N. Fla., also in Mex.—Readily distinguished from *V. æstivalis* by the triangular-topped sharply 3-lobed ash-gray lvs. and the gray tomentum of the young growth.

Var. **floridàna**, Munson (*V. austrìna*, Small). Growing tips rusty-tomentose, as are sometimes the veins on

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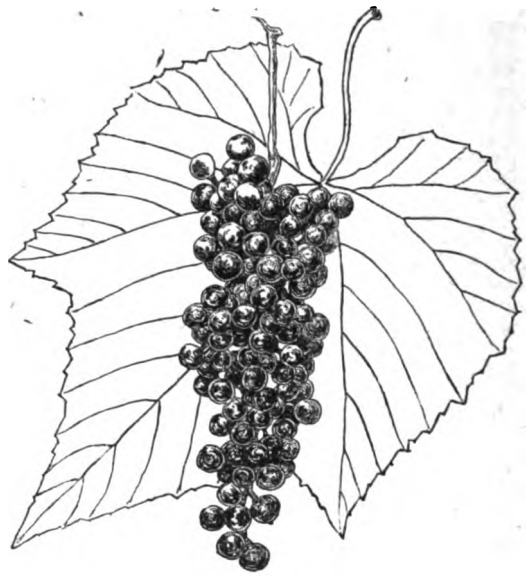
the under sides of the lvs.: cluster longer-peduncled and more compound. Manatee Co., Fla.; and apparently also in Ark.; possibly a compound with *V. æstivalis*, but the lvs. have the characteristic shape of *V. cinerea*. Not to be confounded with any form of *V. caribæa*, because of the lobed triangular-topped lvs. and much larger teeth.

Var. **canéscens**, Bailey. A form with rounded or heart-like lvs., the upper half of the lf. lacking the triangular and 3-lobed shape of the type. St. Louis, Mo., and S. Ill. to Texas.

22. **arizónica**, Engelm. (*V. arizonénsis*, Parry). CAÑON GRAPE. Plant weak, much branched, with short internodes and thick diaphragms, branchlets angled: lvs. mostly small, cordate-ovate and with a prominent triangular-pointed apex, the sinus broad or the base of the blade even truncate, the teeth many and small and pointed or mucronate, the margin either continuous or very indistinctly 3-lobed (or sometimes prominently lobed on young growths), the lvs. and shoots white-woolly when young, but becoming nearly glabrous with age: stamens ascending in sterile fls. and recurved in the fertile ones: bunches small and compound, not greatly, if at all, exceeding the lvs., bearing 20–40 small black berries of pleasant taste; seeds 2–3, medium size. Along river banks, W. Texas to New Mex. and Ariz., mostly south of the 35th parallel, to S. E. Calif. and N. Mex.

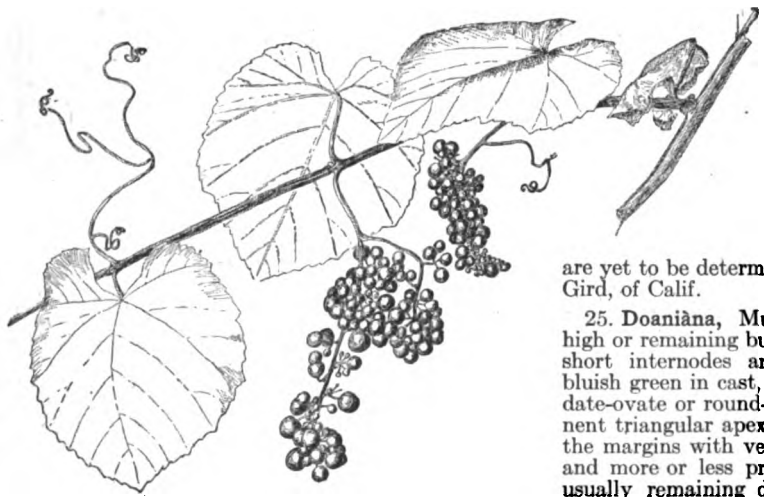
Var. **glàbra**, Munson. Plant glabrous, with glossy and mostly thinner and larger lvs. In mountain gulches, with the species and ranging northward into S. Utah. Distinguished from *V. monticola* by its triangular-pointed and small-toothed lvs. Perhaps a form of *V. Treleasii*.

23. **californica**, Benth. Fig. 3962. A vigorous species, tall-climbing on trees but making bushy clumps when not finding support, the nodes large and diaphragms rather thin: lvs. mostly round-reniform (the broader ones the shape of a horse's hoof-print), rather thin, either glabrous and glossy or (more commonly) cottony-canescent until half grown and usually remaining plainly pubescent below, the sinus ranging from very narrow and deep to broad and open, the margins varying (on the same vine) from finely blunt-toothed to coarsely scallop-toothed (the latter a characteristic feature), the upper portion of the blade either perfectly continuous and rounded or sometimes indistinctly 3-lobed and terminating in a very short apex: bunches medium, mostly long-peduncled and forked, the numerous small berries glaucous-white, seedy and dry but of fair flavor; seed large (¼–⅙in. long), prominently pyriform. Along streams in Cent. and N. Calif. and S. Ore.—Lvs. becoming handsomely colored and mottled in autumn. Very susceptible to mildew.



3961. Vitis cinerea. (×⅓)

24. **Girdiàna**, Munson. VALLEY GRAPE. SOUTHERN CALIFORNIA GRAPE. Strong climbing vine, with thick diaphragms: lvs. medium to large and rather thin, broadly cordate-ovate, with a rather deep and narrow sinus and nearly continuous or obscurely 3-lobed outline (sometimes markedly 3-lobed on young shoots), the teeth many and small and acute, the apex short-triangular or almost none, the under surface remaining closely ashy-tomentose: clusters large and very compound, each one dividing into 3 or 4 nearly equal sections, which are in turn shouldered and thyrse-like: berries small, black and slightly glaucous, the skin thin but tough, pulp finally becoming sweet; seeds medium in size, pyriform. S. Calif., south of the 36th parallel. —Differs from *V. californica* in the more pubescent shoots and foliage, smaller and sharp teeth, decompound clusters, smaller less glaucous berries, and smaller seeds, Shoots of *V. californica* often bear lvs. with small and muticous teeth, and such specimens without the fl.-clusters are difficult to distinguish from this species. Some of the forms which have been referred to *V. Girdiana* are apparently hybrids with the wine grape, *V. vinifera;* the plant is imperfectly understood and its merits as a species are yet to be determined. It bears the name of H. H. Gird, of Calif.



3962. Vitis californica. (×⅓)

25. Doaniàna, Munson. Plant vigorous, climbing high or remaining bushy if failing to find support, with short internodes and rather thin diaphragms: lvs. bluish green in cast, mostly large, thick, and firm, cordate-ovate or round-ovate in outline, bearing a prominent triangular apex, the sinus either deep or shallow, the margins with very large, angular, notch-like teeth and more or less prominent lobes, the under surface usually remaining densely pubescent and the upper surface more or less floccose: cluster medium to small,

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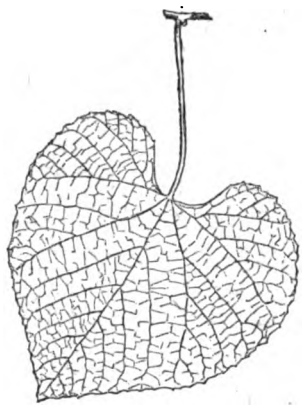
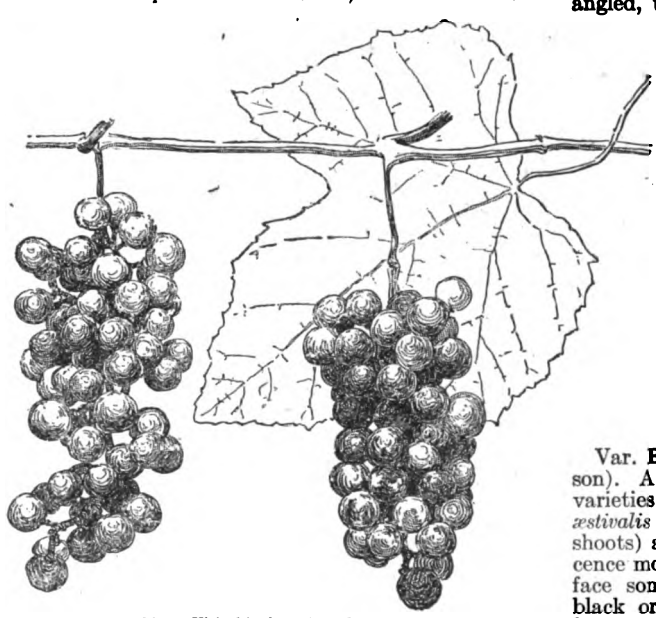
bearing large (⅝in. and less diam.), black, glaucous berries of excellent quality; seeds large (¼–⅜in. long), distinctly pyriform. Chiefly in N. W. Texas, but ranging from Greer Co., Okla., to beyond the Pecos River in New Mex. G.F. 9:455.—The species varies greatly in pubescence, some specimens being very nearly glabrous at maturity and others densely white-tomentose. The plant would pass as a hybrid of *V. vulpina* and *V. candicans*, except that these species do not often occur in its range. It bears the name of Judge J. Doan, of Wilbarger Co., Texas. It gives promise as a parent of pomological grapes. The Arnold Arboretum reports it as "a fast-growing plant and appears to be perfectly at home in New England. The leaves, are large, thick and firm, and rather pale bluish green in color. The fruit, which grows in small clusters, is blue covered with a pale bloom and of fair quality."



3963. Vitis caribæa. (×⅓)

26. **caribæa**, DC. Fig. 3963. Climbing, with flocculent-woolly (or rarely almost glabrous) and striate shoots: tendrils rarely continuous: lvs. cordate-ovate or even broader and mostly acuminate-pointed, sometimes obscurely angled above (but never lobed except now and then on young shoots), becoming glabrous above but generally remaining rufous-tomentose below, the margins set with very small, mucro-tipped sinuate teeth: cluster long and long-peduncled, generally large and very compound: berry small and globose, purple; seed obovate, grooved on the dorsal side. A widely distributed and variable species in the American tropics, running into white-lvd. forms (as in *V. Blancoi*, Munson). Although supposed to occur from Fla. to Texas, Munson is "unable to discover the slightest traces of this species in the U. S.;" he considers the Fla. plants to be hybrids of other species, or forms of *V. cinerea*. The species is considered to be promising for the development of a pomological grape for the tropics (F. S. Earle, Journ. Heredity, Dec., 1915). **V. rufotomentòsa**, Small, differs in having the lf.-blades usually distinctly lobed and the margins coarsely toothed, rusty-tomentose on nerves beneath: sandy soil, Fla to La.



3964. Vitis bicolor. (×⅓)

27. **bícolor**, Le Conte (*V. argentifòlia*, Munson). Blue Grape, or Summer Grape of the N. Fig. 3964. A strong high-climbing vine, with mostly long internodes and thick diaphragms, the young growth and canes generally perfectly glabrous and mostly (but not always) glaucous-blue: tendrils and petioles very long: lvs. large, round-cordate-ovate in outline, glabrous and dull above and very heavily glaucous-blue below, but losing the bloom and becoming dull green very late in the season, those on the young growth deeply 3-5-lobed and on the older growths shallowly 3-lobed, the basal sinus running from deep to shallow, the margins mostly shallow-toothed or sinuate-toothed (at least not so prominently notch-toothed as in *V. æstivalis*): cluster mostly long and nearly simple (sometimes forked), generally with a long or prominent peduncle: the purple and densely glaucous berries of medium size (½in. or less diam.), sour but pleasant-tasted when ripe (just before frost); seeds rather small. Abundant northward along streams and on banks, there taking the place of *V. æstivalis*. Ranges from New England and Ill. to the mountains of W. N. C. and to W. Tenn. —Well distinguished from *V. æstivalis* (at least in its northern forms) by the absence of rufous tomentum, the blue-glaucous small-toothed lvs. and long petioles and tendrils. It has been misunderstood because it loses its glaucous character in autumn; an excellent species as a covering for arbors and trellises.

28. **æstivàlis**, Michx. (*V. Nórtoni*, Prince. *V. Labrúsca* var. *æstivàlis*, Regel. *V. bracteàta* and *V. aranеòsus*, Le Conte). Summer, Bunch, or Pigeon Grape. Strong tall-climbing vine, with medium short internodes, thick diaphragms, and often pubescent petioles: lvs. mostly large, thinnish at first but becoming rather thick, ovate-cordate to round-cordate in outline, the sinus either deep (the basal lobes often overlapping) or broad and open, the limb always lobed or prominently angled, the lobes either 3 or 5, in the latter case the lobal sinuses usually enlarged and rounded at the extremity, the apex of the lf. broadly and often obtusely triangular, the upper surface dull and becoming glabrous and the under surface retaining a covering of copious rusty or red-brown pubescence which clings to the veins and draws together in many small, tufty masses: stamens in fertile fls. reflexed and laterally bent: clusters mostly long and long-peduncled, not greatly branched or even nearly simple (mostly interrupted when in flower), bearing small (½in. or less diam.), black, glaucous berries, which have a tough skin and a pulp ranging from dryish and astringent to juicy and sweet; seeds 2–4, medium size (¼in. or less long). S. N. Y. to Cent. Fla. and westward to the Mississippi and Missouri rivers.—A marked type readily distinguished from other species by the reddish fuzz of the under side of the lvs.

Var. **Bourquiniàna**, Bailey (*V. Bourquiniàna*, Munson). A domestic offshoot, represented in such cult. varieties as Herbemont and Le Noir, differing from *V. æstivalis* in its mostly thinner lvs. which (like the young shoots) are only slightly red-brown below, the pubescence mostly cinerous or dun-colored or the under surface sometimes blue-green: berries large and juicy, black or amber-colored.—A mixed type, much cult S. It is probably exotic, but may have been modified

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by hybridization. Probably to be associated botanically with *V. vinifera.*

29. **Línsecomii,** Buckl. (*V. diversifòlia,* Prince. *V. æstivàlis* var. *Líncecumii,* Munson). POST-OAK. PINE-WOOD, or TURKEY GRAPE. More stocky than *V. æstivalis,* climbing high upon trees but forming a bushy clump when not finding support: lvs. densely tomentose or velvety below: berries large (⅓–¾in. diam.), black and glaucous, mostly palatable; seeds mostly much larger than in *V. æstivalis* (often ⅜in. long). High post-oak (*Quercus stellata*) lands, S. W. Mo. to Texas and E. La.—Munson distinguishes it from *V. æstivalis* by larger berries and seeds, larger lvs. which are bluish in the var. *glauca,* greater endurance of drought. A promising species for the pomologist. It bears the name of Dr. Gideon Lincecum, and is often written *V. Lincecumii,* but if such original spellings as Wisteria, Zanthoriza, Gleditsia, Stewartia and many others are to be retained, consistency requires that we hold to Buckley's original spelling, *V. Linsecomii.*

Var. **glaùca,** Munson (*V. æstivàlis* var. *glaùca,* Bailey). Lvs. and mature wood glaucous-blue on the body beneath, but the veins rusty: berries and seeds larger. S. W. Mo. to N. Texas.—Much like *V. bicolor,* but lvs. thicker and more pubescent below, and tips of shoots rusty-tomentose: berries larger and the clusters strongly shouldered.

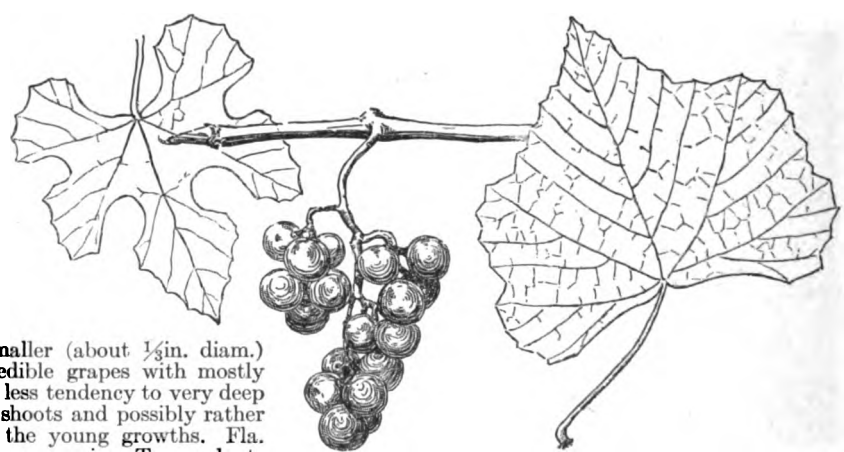
30. **cándicans,** Engelm. (*V. mustangénsis,* Buckl.). MUSTANG GRAPE. Plant strong and high-climbing, with densely woolly young growth (which is generally rusty-tipped), and very thick diaphragms: lvs. medium in size and more or less poplar-like, ranging from reniform-ovate to cordate-ovate or triangular-ovate, dull above but very densely white-tomentose below and on the petioles, the basal sinus very broad and open or usually none whatever (the base of the lf. then nearly truncate), deeply 5–7-lobed (with enlarging rounded sinuses) on the strong shoots and more or less indistinctly lobed or only angled on the normal growths, the margins wavy or sinuate-toothed: stamens in the sterile fls. long and strong, those in the fertile fls. very short and laterally reflexed: cluster small, mostly branched, bearing 12–20 large (¾in. or less diam.) purple or light-colored or even whitish berries, which have a thick skin and a very disagreeable fiery flavor; seeds large, pyriform. W. Ark., Okla., N. Texas, mostly on limestone soils.

Var. **coriàcea,** Bailey (*V. coriàcea,* Shuttlew.). LEATHER-LEAF or CALLOOSA GRAPE. Fig. 3965. Differs from the species chiefly in bearing much smaller (about ½in. diam.) thinner-skinned and more edible grapes with mostly smaller seeds, and perhaps a less tendency to very deep lobing in the lvs. on young shoots and possibly rather more marked rustiness on the young growths. Fla. chiefly southward, in which range various Texan plants reappear.—The more agreeable quality of the fr. is perhaps the result of a more equable and moister climate.

31. **Símpsonii,** Munson. Distinguished by mostly much-cut lvs. on the young shoots and comparatively thin, large, and large-toothed ones on the main shoots, rusty white tomentum below and very prominently brown-tomentose young growths—the character of the lvs. and tomentum varying widely, the foliage sometimes becoming almost blue-green below. Fla.—This is perhaps a hybrid of *V. æstivalis* and *V. candicans* var. *coriacea.* Some forms of it are very like *V. Labrusca,* and might be mistaken for that species. Its botanical position is yet to be determined.

32. **Labrúsca,** Linn. (*V. Blándii,* Prince). FOX GRAPE. SKUNK GRAPE. Fig. 1705, Vol. III. A strong vine, climbing high on thickets and trees: young shoots tawny or fuscous, with much scurfy down: lvs. large and thick, strongly veined (especially beneath), broadly cordate-ovate, mostly obscurely 3-lobed toward the top (on strong growths the sinuses sometimes extending a third or even half the depth of the blade, and rounded and edentate at the bottom) or sometimes nearly continuous in outline and almost deltoid-ovate, the petiolar sinus mostly shallow and very open (ranging to narrow and half or more the length of the petiole), the margins shallowly scallop-toothed with mucro-pointed teeth (or sometimes almost entire), and the apex and lobes acute, the upper surface dull green and becoming glabrous but the lower surface densely covered with a tawny white, dun-colored or red-brown tomentum: stamens long and erect in the sterile fls. and (in wild forms) short and recurved in the fertile ones: raceme short (berries usually less than 20 in wild types), generally simple or very nearly so, in anthesis about the length of the peduncle: berries large and nearly spherical, ranging from purple-black (the common color) to red-brown and amber-green, generally falling from the pedicel when ripe, variable in taste but mostly sweetish musky and sometimes slightly astringent, the skin thick and tough; seeds very large and thick. Cent. New England and southward in the Alleghany region and highlands to W. Cent. Ga. Not known to occur west of E. N. Y. in the N., but occurs in S. Ind. and Tenn.—The parent of the greater part of American cult. grapes (probably largely through hybridization). It is often confounded with *V. æstivalis* in the S., from which it is distinguished by the habitually continuous tendrils, the more felt-like lvs. which are not floccose, and especially by the small-toothed lvs., very short clusters, and large berries and seeds.

33. **Piasézkii,** Maxim. (*Ampelópsis Davidiàna,* Mott.). A species with variable foliage: dicœcious: young branches, petioles, and under surface of lvs. rufous-pubescent: lvs. membranaceous, ternate; lfts. petiolulate, the central one rhomboid and more or less lobed and acuminate, the lateral ones obliquely ovate and acute, all of them incised-serrate: cymes many-fld., becoming forking and exceeding the petiole: fls. small, with calyptrate petals. W. China. **V. Pagnúccii,** Romanet, differs only in being more glabrescent; probably not distinct.—The foliage of this species-group is said to turn bronze-colored in autumn. The lvs. are very variable, sometimes trifoliolate and undivided on the same branch. *V. sinénsis,* Hort., appears to belong here.



3965. Vitis candicans var. coriacea. (×½)

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34. **reticulàta,** Pampanini (*V. Wilsonæ*, Veitch). Scandent shrub with glabrous branches: lvs. ovate-cordate, subreniform, about 3 in. diam., base cordate-truncate, apex very shortly acuminate, margin entire or inconspicuously 3-lobed, glabrous above, cobwebby on the nerves beneath: infl. racemose: fls. in glomerules, minute: fr. black, but glaucous-pruinose, up to ½in. diam. China. G.C. III. 46:236.—Promising.

35. **flexuòsa,** Thunb. Sts. slender and usually flexuose, glabrous at maturity, the new ones more or less rufous-tomentose: lvs. petiolate, cordate-ovate or triangular-ovate, entire or angular-3-lobed, short-cuspidate, unequally dentate, at maturity glabrous above and more or less hairy or floccose beneath (at least on the veins): fl.-cluster peduncled and branching: fr. very small, 2–3-seeded. China, Korea, Japan. Var. **parvifòlia,** Gagnep. (*V. parvifòlia*, Roxbg. *V. flexuòsa* var. *Wilsonii*, Veitch), is a small-lvd. form, cult. for the color of the lvs., which are purple beneath and bronzy with metallic luster above. China.

36. **amurénsis,** Rupr. (*V. vulpìna* var. *amurénsis*, Regel). A hardy species, well known to botanists but little planted although found in growing collections: sts. obscurely angled and striate, the young shoots loosely floccose or webby, later glabrous or nearly so: lvs. green above and beneath, nearly or quite glabrous, cordate-orbicular, some of them more or less 3–5-lobed, apiculate-dentate: fl.-cluster slender-peduncled: fr. small (about ⅛in. diam.), 2–3-seeded. Manchuria, Amoor region. Gn. 54, p. 425. G.Z. 12:160.—It has very ornamental purple-tinted lvs. in autumn.

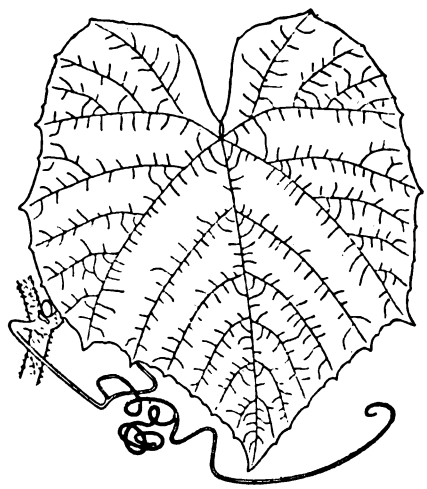
37. **Thúnbergii,** Sieb. & Zucc. (*V. Sièboldii*, Hort.). A variable species resembling *V. Labrusca:* sts. angled, these and other parts rusty-tomentose: lvs. glabrous above, tomentose or pubescent on the nerves beneath, cordate, 3–5-lobed or deeply cut, unequally mucronate-dentate: fl.-cluster shorter than lvs. or about equaling them: fr. very small (⅛–½in. long), 2–3-seeded, purplish black. China, Japan. B.M. 8558.—It is the E. Asian representative of *V. Labrusca*. The plant sometimes cult. under this name is probably *V. pentagona*. A form of *V. Coignetiæ* passes as *V. Thunbergii* in England.

38. **pentagòna,** Diels & Gilg. Climbing, the tendrils interrupted: sts. and lvs. reddish gray-tomentose: lvs. long-petioled, the blade membranaceous, ovate, usually 5-angled, the base truncate or shallowly emarginate, the apex acute, the margin repand and minutely denticulate, lightly pubescent on nerves above but reddish tomentose beneath: thyrse elongated. China. —Allied to *V. lanata*. It appears to have been distributed in cult. as *V. Thunbergii*. Var. **béllula,** Rehd. & Wilson. Lvs. much smaller, 1–2 in. long: very similar to *V. flexuosa* var. *parvifolia*, but lvs. tomentose beneath.

39. **púlchra,** Rehd. Described as a handsome plant with simple more or less obscurely 3-lobed lvs. coarsely serrate, 7–8 in. long and 9–10 in. broad, much like those of *V. Coignetiæ*, villous beneath, the young shoots crimson, the foliage becoming glossy bronze-green and purplish beneath and later deep green. Sts. sparsely floccose, glabrescent, purplish: lvs. ovate to broad-ovate, acuminate, the base shallow cordate or truncate (only rarely deeply cordate), coarsely and unequally toothed, glabrous and somewhat shining above. China or Japan.—Described from plants cult. at the Arnold Arboretum, where it is not quite hardy.

40. **Coignétiæ,** Pulliat. Fig. 3966. Very strong-growing vine, covering trees and arbors with a thatch of heavy showy foliage: branches floccose-tomentose when young: tendrils intermittent: lvs. cordate-orbicular, with 3–5 lobe-like points, the margins shallowly apiculate-toothed, dull above, thickly gray-pubescent beneath: thyrse stalked, short: fr. globular, about ⅓in. diam., practically inedible, although said to be eaten after being frozen by the Japanese. N. Japan. Gn. 49, p. 48; 50, p. 449; 63, p. 209. G. 22:523. R.H. 1898, pp. 426–8. G.C. III. 22:305 (adapted in Fig. 3966).—One of the best of all strong-growing vines, and hardy in the northern states; at Chicago recommended as the best vine for large effects. Its foliage becomes brilliant scarlet in the fall, whence it has been called the "crimson glory vine." In general appearance it much resembles *Vitis Labrusca*. In cult. it has been confused with *V. Thunbergii*. It grows readily from imported seeds; it can also be prop. by layering and by grafting on other stocks. Named for Mme. Coignet, of Lyons, France.

41. **lanàta,** Roxbg. A tropical or warm-temperate variable species, probably not hardy in this country outside the southern parts: sts. and infl. more or less pubescent or tomentose: lvs. 3–6 in. or more long (sometimes very large), sometimes nearly glabrous but



3966. Vitis Coignetiæ.

usually soft-pubescent or tomentose beneath, membranaceous, cordate-ovate, short-acuminate, not lobed: fls. small and green, in a paniculate cyme, the petals rarely separating at the top: fr. purple, size of large pea, 4-seeded. Himalaya to China.

V. ácida, Chapm.=Cissus acida.—*V. aconitifòlia*, Hort.=Ampelopsis.—*V. antárctica*, Benth.=Cissus.—*V. Bàinesii*, Hook. (Cissus Bainesii, Planch., and by him referred to C. Currori). A most remarkable species, the trunk being condensed into a turnip-like body a few inches diam.: lvs. mostly compound, the 3 lfts. dentate, lvs. all borne on short, succulent branches: tendrils none: fls. greenish, in clusters usually raised above the lvs. S. Afr. B.M. 5472.—*V. Baudiniàna*, Brouss.=Cissus antarctica.—*V. betulifòlia*, Diels & Gilg. Sts. sparsely white-floccose: tendrils interrupted: lvs. small and membranaceous, becoming glabrous above, tomentose beneath, ovate-cordate and acute, not lobed or only obscurely so, the margin crenate-serrate. China.—*V. bipinnàta*, Torr. & Gray=Ampelopsis.—*V. cantoniénsis*, Seem.=Ampelopsis. —*V. capreolàta*, Don=Tetrastigma serrulatum.—*V. Delavayàna*, Franch., *V. Delavàyi*, Hort.=Ampelopsis.—*V. élegans*, C. Koch=Ampelopsis heterophylla var.—*V. gongylòdes*, Baker=Cissus.—*V. Henryàna*, Hemsl.=Parthenocissus.—*V. heterophýlla*, Thunb.=Ampelopsis.—*V. himalayàna*, Laws., and var. *rubrifòlia*, Hort.=Parthenocissus, p. 2479.—*V. incónstans*, Miq.=Parthenocissus tricuspidata.—*V. japónica*, Thunb.=Cissus.—*V. lewisàes*, Maxim. =Ampelopsis, p. 278.—*V. Lindenii*, Hort.=Cissus, p. 776.—*V. megalophýlla*, Veitch=Ampelopsis.—*V. obtécta*, Wall.=Tetrastigma.—*V. orientàlis*, Boiss.=Ampelopsis.—*V. pteróphora*, Baker =Cissus.—*V. rèpens*, Veitch=Ampelopsis micans.—*V. rubrifòlia*, Lév. & Van.=Parthenocissus himalayana var.—*V. semicordàta*, Wall., is Parthenocissus semicordata, Planch. (P. himalayana var. semicordata, Laws.). Self-clinging plant: lfts. 3–5, ovate, tapering to summit, the young parts hispid-pubescent. Himalaya.—*V. sempérvirens*, Hort.=Cissus striata.—*V. serjaniæfòlia*, Maxim.=Ampelopsis japonica.—*V. Thómsonii*, Laws.=Parthenocissus. p. 2479.—*V. tiliæfòlia*, HBK. Mexico, recently intro. for trial: said to have a very sour fr. but useful for jellies: by Planchon referred to V. caribæa.—*V. Tìtànea*, Hort., described as a vigorous species from Japan: lvs. dark green, with rounded lobes: berries black, in small bunches.—*V. tricuspidàta*, Lynch=Parthenocissus tricuspidata.—*V. variegàta*, Hort., is likely to be Ampelopsis

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heterophylla var.—*V. Voinieriàna*, Balt. Climbing, the tendrils spiral, red-rusty: lvs. persistent, coriaceous, long-stalked, digitate with usually 5 elliptical coarsely dentate lfts. which are glabrous above and bright green: fls. in axillary short-peduncled cymes, hermaphrodite; sepals 4, oval, shorter than the 4 oval-lanceolate separate petals: carpels woolly, with a short 4-lobed style, the 2 carpels biovulate. Tonkin. R.H. 1902, pp. 56, 57. R.B. 28:3. Genus doubtful.—*V. vomerénsis*, Hort., "observed in a Nice villa garden:" robust, sts. brown-felted: lvs. large and leathery, deeply cut into fine lobes, brown-tomentose, deep olive-green at maturity.

L. H. B.

VITTADÍNIA (Dr. C. Vittadini, an Austrian who wrote on fungi, 1826–1842). *Compósitæ*. Herbs with a thick caudex, or branching subshrubs.

Leaves alternate, entire or variously cut: heads rather small, with a yellow disk and white or blue rays, terminal, solitary or in loose leafy corymbs: involucre of several rows: rays pistillate, numerous, crowded, in more than one row: achenes narrow, compressed or flat, with or without ribs on the faces; pappus of numerous, often unequal capillary bristles.—About 14 species, natives of Austral., New Zeal., S. Amer., and Hawaiian Isls. The genus is closely related to Erigeron, differing in habit and in the appendages of the style-branches, those of Erigeron being short, while those of Vittadinia are awl-shaped. For *V. triloba*, Hort., not DC., see *Erigeron mucronatus*.

austràlis, A. Rich. (*V. tríloba*, DC., not Hort.). Herbaceous plant of uncertain duration, 1 ft. high or less, tomentose: lvs. obovate or spatulate to linear-cuneate, entire or coarsely 3-toothed or lobed: heads

3967. Vittaria filifolia.

solitary: rays narrow: said to be revolute (which may apply only to dried specimens). G.W. 11, p. 129. Austral., Tasmania.—There are botanical varieties.

V. tricolor, Hort., is apparently V. australis, A. Rich.

WILHELM MILLER.

VITTÀRIA (Latin, a *fillet* or *head-band* or *? vitta*, a *line*). *Polypodiàceæ*. A genus of about 40 species of tropical ferns mostly with narrow cord-like lvs. growing pendent from trees: sporangia borne in 2 lines along the margins. **V. lineàta**, Swartz, OLD MAN'S BEARD, is a tropical American species which is found as far north as Cent. Fla., where it grows on the cabbage palmetto. Rare in cult. and interesting only as an oddity. **V. filifòlia**, Fée. Fig. 3967. A small species, 10–12 in., which is representative in appearance and habit of most of the species; sometimes found in choice collections. Trop. Amer.

L. M. UNDERWOOD.

VOANDZÈIA (from a native name). *Leguminòsæ*. One species, *V. subterrànea*, Thouars, cult. widely by the natives of Cent. Afr. for its underground peanut-like seeds. It is a prostrate herb with a creeping pubescent rhizome from which arise slender-stalked compound lvs.: lfts. 3, oblong or lanceolate, 3 in. or less long, with minute obtuse stipels: fls. yellow, ¼ or ⅓in. long, papilionaceous, 1–3 on flexuous peduncles; calyx very small; standard obovate; wings equaling standard, oblanceolate; keel boat-shaped, not beaked; stamens diadelphous: fr. a tuber-like roundish pod, about ½in. or more long, with 1 or 2 small seeds; the peduncle elongates after flowering and the ovary is buried in the earth, where the fr. ripens; seeds globose-ellipsoidal, about 3/16–3/8in. long, yellow-mottled. Until very recently the plant has been unknown in a wild state, but it has now been found natively in Nigeria and German Adamaua (see Kew Bull. 1912, p. 213; and in this article the plant is distinguished from *Kerstingiella geocarpa*, page 1737, another underground legume widely cult. in Trop. Afr.). Voandzeia appears not to have been intro. in this country.

L. H. B.

VOCHÍSIA (*Vochy* is the name of one of the species in Guiana). *Vochysiàceæ*. Glabrous or tomentose usually resinous trees, frequently tall shrubs, occasionally grown in the warmhouse: lvs. decussately opposite or verticillate, usually leathery; stipules small, subulate: fls. rather large, yellow, odorous, in elongated composite racemes or panicles; pedicels 2-bracted; sepals 5, connate at base, lateral and anterior very short, posterior largest, usually spurred; petals 1–3, linear or spatulate, anterior commonly larger than the others; stamen 1, fertile; ovary 3-celled: caps. leathery or woody, 3-celled, loculicidally 3-valved.—About 60 species, natives of Brazil, Guiana, E. Peru, and Colombia. The spelling Vochysia is later.

V. ferruginea, Mart. (V. tomentosa, DC.). Tree, 25 ft. or more high: lvs. oval-oblong, long-acuminate, attenuate at base, glabrous above, ferrugineous-tomentose beneath: fls. in terminal racemes, which are loose and slightly nodding. Guiana.—*V. guianénsis*, Aubl. Tree, 12 ft. or more high: lvs. obovate-oblong, shortly acuminate, glabrous on both surfaces: fls. in simple racemes, which are erect, terminal and dense-fld.; spur spreading. Guiana.

VOLKAMÈRIA: *Clerodendron*.

VOLUTARÉLLA (diminutive of *Volutaria*). Syn., *Amberbòa*. *Compósitæ*. Erect or divaricately diffuse villous or glabrous annual herbs, sparingly grown in Calif.: lvs. alternate, erose-dentate or remotely pinnatifid: heads heterogamous, outer fls. 1-row, neuter, disk-fls. fertile; involucre ovoid or globose; bracts in many rows, imbricate; corolla purplish, violet, or blue, regular tube slender and very short, limb cylindrical, deeply 5-lobed: achenes obovoid or oblong, prominently 10–15-ribbed. About 7 species, Medit. region, W. Asia, and India. This genus is treated as a part of Centaurea by Hoffmann in Engler and Prantl, Pflanzenfamilien IV, pt. 5. *V. muricàta*, Benth. & Hook. f. (*Amberbòa muricàta*, DC.). St. erect, 1–2 ft. high: basal lvs. lanceolate, attenuate to the petiole; cauline sessile, middle ones auricled, upper and lowest not auricled, linear- or oblong-lanceolate: fls. purple. Spain and Morocco.

According to the Brussel's Congress, Amberboa is placed in the list of "nomina conservanda," and if this ruling is followed, the species above mentioned will retake the name *A. muricata*, DC.

VOUÀPA (native name in Guiana). *Leguminòsæ*. Unarmed trees, rarely cult.: lvs. abruptly or somewhat odd-pinnately-compound; lfts. sometimes 1 or few-paired, sometimes many-paired; stipules leafy or inconspicuous: fls. yellow, red, or white, small or medium-sized, in terminal and axillary simple racemes or shortly fascicled-paniculate; calyx-tube bearing a disk, short-turbinate, rarely narrow, segms. 4; petals, uppermost clawed, 2–4, lower small, scale-like or none;

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perfect stamens 3; ovary stipitate, 3- to many-ovuled: pod obliquely orbiculate, ovate-oblong or falcate, plano-compressed, leathery, 2-valved. About 45 species, Trop. Amer. and Trop. Afr. This is the oldest generic name, but the name Macrolobium is retained by the list of "nomina conservanda" accepted at Vienna. *Macrolòbium bifòlium*, Pers. (*M. Vuàpa*, J. F. Gmel. *Vouàpa bifòlia*, Aubl.). Tree, about 10 ft. high: lfts. sessile, ovate, acuminate, oblique: fls. violet; calyx-lobes spreading; stamens nearly equaling the corolla. Guiana.

VRIÈSIA (named for Dr. W. de Vriese, of Amsterdam). *Bromeliàceæ*. Often spelled *Vriesea*, but not so spelled by Lindley, who founded the genus. Tropical American stiff-leaved plants, with mostly distichous spikes bearing large and showy bracts. According to Mez (DC. Monogr. Phaner. 9), 84 species are to be referred to this genus. They are very like tillandsias, with which they are united by Bentham & Hooker and others. The chief technical difference is the presence in Vriesia of 2 ligules or a single cleft or emarginate ligule on the inside of the base of petals. Culturally, vriesias are like tillandsias. They run to forms with marbled and banded lvs. Several species have been intro. in recent years, and many garden hybrids have been produced. Few kinds are offered in the American trade, and only these kinds are described here. For other kinds, see the monographs of Baker and Mez; also the accounts from time to time in horticultural publications. For cult., see *Tillandsia*.

A. *Stamens longer than the petals.*

B. *Infl. branched.*

Saûndersii, Morr. (*Tillándsia Saùndersii*, C. Koch. *Encholírium Saùndersii*, André). About 1½ ft. high when in bloom: lvs. many, in a rosette, rather short, strongly recurving, grayish and somewhat white-dotted above, spotted with red-brown beneath: fls. in a branched open infl., sulfur-yellow, cylindrical in form. Brazil. I.H. 20:132.

BB. *Infl. simple.*

C. *Bracts of infl. strongly imbricate.*

speciòsa, Hook. (*Tillándsia splèndens*, Hort. *T. pícta*, Hort. *T. zebrìna*, Hort., in part). Fig. 3968.

3968. Vriesia speciosa.

Strong-growing plant, with broad, strong, arching-ascending lvs. 1 ft. or more long, which are bright green and marked with dark brown transverse bands: spike with densely imbricated bright red acuminate bracts, the scape spotted: fls. exserted, yellowish white. Guiana. B.M. 4382. F.S. 2:107; 6, p. 162. R.H. 1846: 41. F.W. 1874:33 (as *V. brachystachys*).—One of the best and most showy species. A robust form is var. **màjor,** Hort. See supplementary list below for additional note on *V. zebrina*.

3969. Vriesia carinata.

carinàta, Wawra (*V. brachýstachys*, Regel. *Tillándsia carinàta*, Baker). Fig. 3969. Lvs. rosulate, about 6 in. long, the base sheathing, mucronate at the tip, somewhat glaucous, not spotted: spike with wide-spreading nearly divaricate acuminate bracts which are scarlet at the base and yellowish green at the end: fls. protruding, pale yellow. Brazil. B.M. 6014.

CC. *Bracts of infl. remote, not imbricate.*

guttàta, Lind. & André (*Tillándsia guttàta*, Baker). Lvs. rosulate, erect-arching, short and rather broad, mucronate, olive-green with irregular spots of brown-purple: bracts farinose, rose-colored, the scape slender: fls. yellow. Brazil. I.H. 22:200.

psittacìna, Lindl. (*Tillándsia psittacìna*, Hook.). About 1 ft. high when in bloom: lvs. rosulate, 6–10 in. long, dilated at the base, yellowish green: fls. large, yellow with green tips, scattered on a distichous spike, the bracts red at the base and yellow at the top. Brazil. B.R. 29:10, where the genus is founded. B.M. 2841. R.H. 1855:221.—A showy species when in bloom.

AA. *Stamens shorter than the petals.*

B. *Lvs. not barred, mottled, or tessellated.*

heliconioìdes, Lindl. (*V. béllula*, Hort. *Tillándsia heliconioìdes*, HBK.). Dwarf and tufted, with many rosulate recurving or arching lanceolate lvs. (about 12 in. long) which are bright green above and purple-tinged beneath: scape overtopping the foliage, simple and erect, with wide-spreading distichous boat-shaped bracts that are light red at the base and greenish at the tip, showy: fls. white. Colombia. I.H. 30:490. G.C. II. 21:140.

BB. *Lvs. tessellated (marked in small checkerwork) or minutely variegated.*

tessellàta, Morr. (*Tillándsia tessellàta*, Lind.). Lvs. short and rather broad, rosulate, dilated at base, short-pointed, rather stiff, channeled, tessellated with green and yellow: infl. paniculate, the greenish bracts remote: fls. yellow. Brazil. I.H. 21:179. R.H. 1889, p. 573.

fenestràlis, Lind. & André (*Tillándsia fenestràlis*, Hook. f.). Robust, densely tufted, the lvs. stout (1–2 ft.

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long) and recurved, brown-tipped, with many dark green veins and cross veins: infl. a simple stout spike 1½ ft. long and bearing green-spotted bracts: fls. pale yellow. Brazil. B.M. 6898. I.H. 22:215.

BBB. *Lvs. marked with strong transverse bands.*

hieroglýphica, Morr. (*Tillándsia hieroglýphica,* Bull.). Fig. 3970. Lvs. many, rosulate, stout, recurved, short-acute, very strongly and irregularly marked and banded with dark green above and brown-purple beneath: infl. paniculate, the bracts broadly elliptic-ovate, the fls. yellowish. Brazil. I.H. 31:514; 42, p. 318. R.H. 1891:400. Gn. 37, p. 244 (adapted in Fig. 3970).—A very striking and showy plant. Sometimes known as a Massangea.

V. Blòkii, Hort. (Tillandsia Blokii, Hort.). Infl. crimson, pinnately paniculate, 4–5 ft. tall; floral bracts ovate: fls. in 2 rows, 4 in. long; petals yellow, linear, about 4 in. long. S. Amer. B.M. 8192. G.C. III. 45:358.—*V. fúlgida,* Hort., has been catalogued in this country. It is a garden hybrid (V. incurvata×V. Duvalii). It has short green lvs. and an exserted simple spike with distichous bright red imbricated bracts. I.H. 35:67.—*V. glaucophýlla,* Hook., is Tillandsia fasciculata.—*V. Leopoldiàna*=V. splendens×V. Malzinci. Gt. 54:1539.—*V. musàica*=Guzmannia.—*V. regina,* Ant. Lvs. very long-acute: infl. large; bracts elliptic-ovate, rounded at apex: fls. dirty yellow. Brazil.—*V. Rex.* Hybrid. R.H. 1907:570.—*V. zebrina,* Hort., is sometimes V. splendens and sometimes Cryptanthus zonatus.

L. H. B.

VULNERÀRIA: *Anthyllis.*

VUYLSTEKEÀRA, a multigeneric orchid hybrid embracing Cochlioda, Miltonia, and Odontoglossum. It bears the name of Charles Vuylsteke, of Ghent, Belgium, and the name is conformable with Adamara, Linneara, Lowiara, Wilsonara. Only two species or species-forms (very recent) are recorded, the first of which has been in doubt as to parentage. These are *V. insignis,* Hort., recorded (G.C. III. 56:14) as a hybrid of *Miltonioda Bleuana* and *Odontioda Charlesworthii,* bearing cream-white fls. with brownish spots; and *V. Hyeana,* Hort., a hybrid between *Odontonia Lairessex* and *Cochlioda Noezliana,* with fls. 2 in. across with a cinnabar tint suffusing the greater part of the surface of the sepals and petals after the color of *C. Noezliana,* but with the form of fl. approaching *O. Lairessex* especially in the center of the labellum, which is white tinged rose-color, and the base having a crest of yellow ridges on a red ground in front of which is a large shining brownish yellow raised blotch similar to that in *Miltonia Warscewiczii.*

3970. Vriesia hieroglyphica.

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W

WAHLENBÉRGIA (named after Georg Wahlenberg, 1780–1851, Swedish botanist). Including *Edraiánthus* (*Hedræanthus*). *Campanulàceæ*. Annual or perennial herbs, base of the stems sometimes woody, used as greenhouse and border plants, mostly the latter.

Leaves alternate, rarely opposite: infl. usually irregularly centrifugal; peduncles terminal, lateral or axillary, solitary or rarely paniculate: fls. usually blue and nodding; calyx-tube adnate, hemispherical, turbinate or obconical-oblong, limb 5-parted, very rarely 3–4-merous; corolla campanulate, funnel-shaped, tubular or rather rotate, 5-cleft, very rarely 3–4-cleft; ovary inferior or semi-superior, 2–5-celled: caps. erect, loculicidally 5-valved.—About 110 species, Eu., Medit. region, S. Afr., and Trop. Amer. This treatment includes Edraianthus, which is often kept as a distinct genus. The species are used mostly as rock-garden plants, and receive the treatment given campanulas.

A. *Plants with clustered tubers.*

tuberòsa, Hook. f. Glabrous, with clustered, aboveground tubers: sts. slender, erect, 6–24 in. high, branched and leafy: lvs. about 1 in. long, linear, acute or obtuse, dentate, 1-nerved: fls. in a terminal panicle, white, red-purple-veined; calyx-lobes linear, spreading; corolla campanulate, lobes short and recurved. Island of Juan Fernandez. B.M. 6155. G.Z. 21, p. 217.

3971. Wahlenbergia serpyllifolia. (×½)

AA. *Plants without clustered tubers.*

B. *Lvs. basal clustered, narrow: plants perennial.* (*Section Edraiantha.*)

C. *Fls. solitary on the peduncles.*

serpyllifòlia, G. Beck (*Campánula serpyllifòlia*, Vis. *Edraiánthus serpyllifòlius*, A. DC.). Fig. 3971. Sts. cespitose, procumbent, glabrous: lvs. oblong-lanceolate, obtuse, ciliate: fls. solitary, on sts. about 2 in. high, deep purple; calyx-tube ovoid, rather glabrous, lobes ovate-lanceolate; corolla campanulate. Dalmatia. G.C. III. 45:243. G. 36:143. Gn. 75, p. 103. Var. **dinàrica,** Hort. (*W. dinàrica*, Hort.), has narrow silvery lvs. and blue fls. G.M. 58:285. Var. **màjor,** Hort., is slightly larger than the type. Gn. 78, p. 338.

CC. *Fls. several to numerous on the peduncles.*

dalmática, A. DC. (*Edraiánthus dalmáticus*, A. DC.). Sts. ascending or erect, about 3 in. high, glabrous: lvs. linear-lanceolate, entire, hairy-ciliate, 1–2 in. long: fls. in a terminal 6–10-fld. head, blue; calyx-tube rather pilose, lobes triangular; corolla-lobes acute. Dalmatia. G. 36:142.

Pumílio, A. DC. (*Edraiánthus Pumílio*, A. DC.). Cespitose: sts. very short, leafy: lvs. linear, entire, about ½in. long, glabrous beneath, pilose above: fls. numerous, azure-blue; calyx-tube obconical, glabrous, lobes lf.-like; corolla-lobes ovate, acute. Dalmatia. G.C. III. 53:59. G.W. 15, p. 345.

BB. *Lvs. alternate or opposite and narrow, scattered along the sts.: plants usually annual.*

C. *Blades nearly rotund.*

hederàcea, Reichb. Sts. filiform, creeping or ascending, branched, 4–10 in. long: lvs. long-petioled, cordate, obtuse, 5–7-angled, nearly rotund, about ½in. diam.: fls. few, terminal, pale blue-lilac; calyx glabrous, tube hemispherical, lobes linear-subulate; corolla-lobes ovate, acute. Eu.

CC. *Blades linear to lanceolate or narrowly obovate.*

grácilis, Schrad. (*W. vincæflòra*, Decne.). Sts. simple or branched, 6–12 in. high, erect or somewhat decum bent: lvs. alternate or subopposite, linear-lanceolate, sinuate-dentate, about ½in. long: peduncles terminal or axillary: fls. blue; calyx rather glabrous, tube ovoid, lobes acuminate; corolla-lobes ovate, acute. Tropical and south temperate regions of the Old World. G.C. III. 52:215.

saxícola, A. DC. Sts. short, tufted, 1 in. or more long: lvs. clustered, petioled, obovate or spatulate to almost linear, ½–1 in. long: scapes 1-fld., 2–6 in. high: fls. white, veined with blue; calyx glabrous, lobes narrow-triangular; corolla-tube purplish outside, lobes oblong, broadly deltoid, acute. Tasmania. G.37:21. Gn. 65, p. 269.

W. gentianoides, Hort., is offered in the trade as a rock-plant growing a foot high, with erect wiry sts. and bright blue fls.—*W. grandiflòra*, Schrad., is Platycodon grandiflorum.

F. Tracy Hubbard.

WÀITZIA (F. A. C. Waitz, born 1768, at Schaumburg, Germany, state physician to the Dutch at Samarang, Java; wrote on Javanese plants). *Compósitæ*. Includes one of the rarer "everlasting flowers," a half-hardy annual which bears flat-topped clusters of yellow flower-heads, with a golden disk.

Mostly annuals: lvs. alternate, linear or nearly so: fl.-heads in terminal corymbs or rarely in oblong leafy racemes: involucre various in outline, the bracts overlapping in many rows, all colored and petal-like: receptacle flat, without scales: anthers provided with tails of very small size: achenes somewhat compressed, glabrous or papillose, terminating in a slender beak; pappus of capillary bristles usually cohering at the base, simple, barbellate or plumose.—Seven species from Austral. The genus is distinguished from Helipterum and Helichrysum by the beaked achenes.

grandiflòra, Naudin. Half-hardy everlasting or "immortelle," annual, exceeding 18 in. height: lvs. lanceolate, long-acuminate, sessile, green above, slightly villous beneath, prominent midrib beneath: fls. yellow, in terminal corymbs; clusters about 5 in. across, and heads 2 in. across, the showy part being the involucral bracts, which are arranged in 4 or 5 series, and are petal-like in character but of stiffer texture than ordinary petals. F. 1865:41, where it was originally described.—Probably the most desirable of the genus.

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It seems to have replaced *W. aurea*, Steetz, the favorite of a former generation, being larger-fld., more robust, and rather easier of cult. WILHELM MILLER.

WAKE ROBIN: In England, *Arum maculatum;* in America, *Trillium.*

3972. Yellow or barren strawberry.—Waldsteinia fragarioides. (×½)

WALDSTEÌNIA (named after Franz Adam, Count of Waldstein-Wartenburg, born 1759 at Vienna; wrote with Kitaibel an illustrated work on rare plants of Hungary; died 1823). *Rosàceæ.* Creeping herbs with the habit of Fragaria, perennial and hardy, used in the border as an edging and on rockeries.

Leaves mainly radical, 3–5-lobed or -divided: fls. small, yellow, borne on bracted scapes; calyx-tube inversely conical, limb 5-cleft, with 5 often minute and deciduous bractlets; petals 5; stamens many, inserted into the throat of the calyx: achenes 2–6, minutely hairy.—About 5 species, Cent. and E. Eu., N. Asia, and [illegible] er. Of simple cult.

[illegible] barren strawberry, *W. fragarioides*, is [illegible] looks much like a slender strawberry [illegible] flowers and bears no edible fruit. It is [illegible] merican tufted perennial herb, about 4 [illegible] h glossy leaves composed of three wedge-shaped leaflets, and five-petaled flowers less than ½ inch across. It comes with the first rush of spring, and continues to bloom until summer. There is little satisfaction in growing only a few plants of this wild flower. The plant is appropriate to the rockery, where every effort should be made to induce it to form a large mat. Masses of the yellow strawberry have been used with good effect for edging shrubbery borders, and the plant is listed in the trade.

fragarioìdes, Tratt. Fig. 3972. Pubescent or nearly glabrous: lfts. dentate or crenate except at the base, 1–2 in. long: scapes corymbosely 3–8-fld.: achenes 4–6. May, June. Woods and shaded hillsides, New England to Minn. and Ind., along the Alleghanies to Ga. B.B. 2:218. R.H. 1890, p. 510. B.M. 1567 and L.B.C. 5:408 (both as *Dalibarda fragarioides*).

sibìrica, Tratt. (*W. trifòlia*, Rochel. *W. trifoliàta*, Steud.). Sts. creeping, pilose, leafy at their tip: lvs. erect, alternate, petioled, ternate; lfts. very short-petioluled, obovate, base cuneiform, entire; stipules none: scapes 1 or several, axillary, 3–5-fld.: fls. hermaphrodite, nodding, white; calyx-lobes ovate; petals spreading, subrotund. Siberia. J.H. III. 45:217.

lobàta, Torr. & Gray. Foliage slightly hairy; lvs. cordate, 3-lobed, the lobes crenate with mucronulate teeth; petioles slender, longer than blades: scapes about as long as lvs.: sepals triangular-lanceolate, acute; petals narrowly oblong or elliptic: achenes usually 2, densely pubescent. S. W. Ga. F. TRACY HUBBARD†.

WALKING-LEAF FERN: *Camptosorus.*

WALKS, PATHS, AND DRIVEWAYS. That gardens and grounds may be reached at all times in any weather, walks are introduced to afford dry comfortable routes. They should be laid out to conform to and emphasize the garden design. However, too much gravel or a too complicated system will mar the purpose and scale of the garden and detract from its charm. It is necessary, therefore, that the paths be kept in proportion by adopting various widths according to the amount of travel expected and the importance of certain lines in the design. Principal lines or "axes" of the design may be emphasized by widths of 6 to 14 feet; secondary by 4 to 8 feet; minor, 2½ to 4 feet. It may be added that straight paths should be wider proportionately than curving ones. Paths may also be maintained in scale by use of different materials, using stone or brick for the principal ones; gravel, tanbark, or stepping-stones for secondary; grass for the least important. The color of path material also influences the garden appearance, and the simpler the garden character the less pronounced should be its path-colors. Turf is the least and cement the most conspicuous of materials.

Grass paths should be designed for unusual wear, and a depth of at least a foot of well under-drained soil provided. Many simple gardens have turf paths only, but these are at a disadvantage in wet weather or dew. If the wear is more than grass will stand, or the garden lines need more emphasis, stepping-stones may be introduced in the grass. (Fig. 3973.)

Stepping-stone paths are simplest made of native rock of irregular shapes (Fig. 3974); more refined if of native rock, hammer-dressed; and still more refined if of regular blocks, slate, flag, or cement, (12 by 12 inches) square, or (12 by 24 inches) rectangular (Fig. 3974). The stones should be set 20 inches apart,

3973. A good garden walk.

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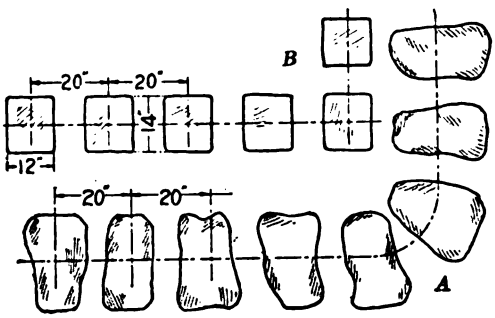
center to center, well bedded in earth, and level with the sod.

Tanbark paths, grass-bordered, are a degree more pronounced. The tanbark should be spread 2 inches thick over a bottom of 6 to 12 inches of broken stone or cinders. If the path is of such importance to the



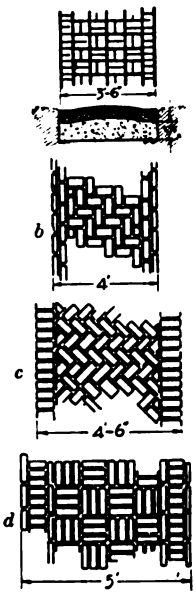
3974. A, Stepping-stones in the grass—the simplest dry path in the natural style. B, The same, conventionalized for the formal style.

design as to demand greater width, the character should change, and gravel or crushed stone be used.

For macadam paths (Fig. 3975) excavate 8 inches at the sides, 6 inches in center, and lay 5 inches of stone or "spawls" on edge across the path. Over this spread 2 inches of crushed stone the size of a hen's egg (1½-inch stone) and a sprinkling of clayish soil, and roll firm, a hand roller being used. An inch of crushed limestone or hard shale should then be spread and rolled until a firm hard surface results. The walk should be raised 1 inch at the center for each 2 feet of width. These hard walks must be contained by borders of grass sod, boxwood, stone, brick, or cement curb. The curb should stand only 1 inch above the walk-surface; it should be 2½ inches wide for a 4-foot path and ½ inch wider for each added foot width of the walk up to 4 inches, which is sufficient for a highway.

Gravel paths appear well up to any width, but as they are widened their color increases in design importance. Many garden designers use red gravel only; others prefer blue trappe rock; few use washed beach gravel or other white surface material because of its glare. This fault is a grievous one with respect to cement as a walk material; it also seems too artificial and not gardenesque.

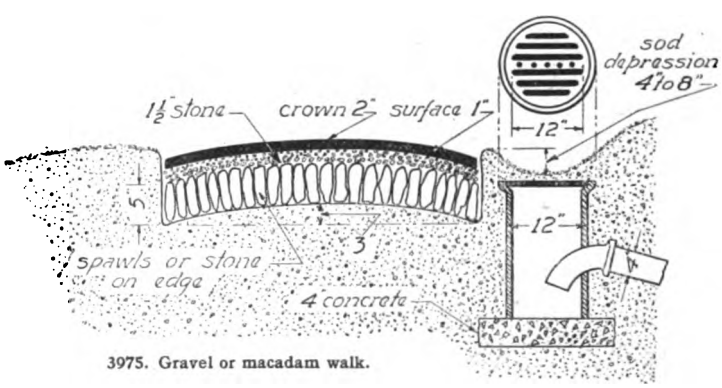
Brick in various colors and textures is an old and valuable path material which meets the requirements of color, texture, interest, drainage, and neatness, as well as anything yet devised. The pattern of laying should not be complicated to the degree of attracting attention which should be bestowed on the garden itself. In front of seats or steps, about a pool or a garden dial, it may be embellished by special design or by tile introduced into the pattern. Usually the patterns are three, or adaptation of those shown in Fig. 3976. A tile effect can be secured by using extra-wide joints, but glazed tile will be found too slippery for out-of-door use. Brick walks should be laid over a foundation of 16 inches of cinders or broken stone, for drainage and to prevent heaving by frost. To lay "dry," an inch of sand is spread upon this foundation, the bricks laid and afterward swept over with sand until joints are filled. If a cemented job is desired, spread 3 inches of concrete upon the "frostproof" foundation; lay the brick upon a layer of cement mortar spread above the concrete, and pour the brick joints afterward with cement (one part), sand (one part); scour the bricks with muriatic acid, one part to ten of water.



3976. Forms of simple brick walks. *a*, Basketry pattern; *b*, straight herringbone; *c*, herringbone, corner cutting required but effectiveness of pattern increased; *d*, basket, with Roman (or extra-size) brick.

Much may be said in favor of stone paths. It is a material full of interest and generally harmonizes well in garden or lawn. The stones, as a rule, should be larger if the walk or terrace is wide or long. They may be laid regularly or irregularly (Fig. 3977); smooth or rough of surface; cemented joints over foundations as for bricks; or laid with grass joints. These last are very gardenesque, particularly if the joints are planted with low-lying perennials like *Sedum acre*, *Armeria vulgaris*, certain saxifragas, and *Veronica rupestris*. Such a walk is not easy to keep free of either snow or heavy dew, so that it must not be laid where service demands dryness.

In the English or natural landscape style, lawns and informal gardens are made up of grass, shrubs, trees, and vistas. Paths are introduced for the sole purpose of giving easy access to various points or objects of interest and are not relevant, as in formal gardens, to the design. On the other hand, it is easy to intercept and spoil a vista, subdivide charming greensward, or mar a graceful slope by introducing a walk. Considerable study is required to lay out paths which will be direct, serving the practical needs of the place without interfering with esthetic considerations. Usually it is best accomplished by keeping paths somewhat toward boundaries, and consisting of graceful long curves in harmony with the general rounded outlines of foliage, foregrounds, and slopes in hillsides, rather than by more conventional straight lines, directed through centers. These paths must not seem circuitous or precipitous, however, and the interest must be satisfying to the traveler by presenting special vistas, close examination of interesting plantings, providing good restful benches, passing through arches or otherwise made interesting and seemingly short. Paths of this character must not be laid out in an unrelated system nor built simply to break up lawns and afford aimless strolls. It should not often be necessary for the traveler to return the way he came along a path, at least any distance, and even in small



3975. Gravel or macadam walk.

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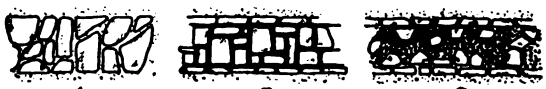
grounds a full circuit should be devised, or else no path-scheme laid out at all. When crossing a vista, as is often necessary to secure directness or continuity, the path may be graded lower to obscure its course (Fig. 3978), or it may be of an inconspicuous material such



3977. Forms of stone paths of a gardenesque appearance. *A*, grass or flower joints; *B*, cement joints; *C*, cobbles and stones in cement.

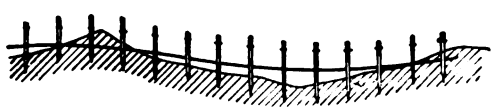
as a blue slate, brown stones, or dark stepping-stones with grass joints (Fig. 3973).

The materials of such lawn-paths may be simply of turf when passage is through woods or meadows. This latter charming device is secured by mowing a strip through the longer meadow grass and daisies. Macadam or gravel is usually the method of construction.

For crowded parks, the width should be 8 to 12 feet or more. The construction may be heavier by 2 inches, and special care given to drainage. Oiled macadam, valuable for roads, is not suitable for paths unless top-surfaced with fine screenings to prevent tracking the oil.

3978. Walk crossing a lawn in slight depression for concealment.

Asphalt paths are sometimes used and are best if the residuum used in the flux of the surface coat be reduced to the minimum in order to leave as hard a pavement as possible. Concrete is being more generally used because of its wearing properties. It should be colored with red ochre, and lamp-black to destroy the usual whiteness of cement surface. These walks may be constructed in the usual way (8 inches cinders, 3 inches concrete, 1 inch cement float), except that the surface should be rough finished—neither troweled nor rolled. Wing walks at each side of the cement may often be provided to good advantage. They are 2 to 4 feet wide, made of 4 inches of gravel (or crushed stone) laid upon 6 inches of cinders or broken stone.



3979. Transition of grades. Method of sighting by stakes and twine.

Drainage should be provided for all paths. Brick, asphalt, or cement walks should be crowned in the center or on the high side. Three-fourths of an inch is sufficient for an 8-foot cement walk. At each side, or at the upper side at least, of paths on a slope, drainage should be provided by sod gutters. These will carry the surface water to park inlets which discharge into sewer lines.

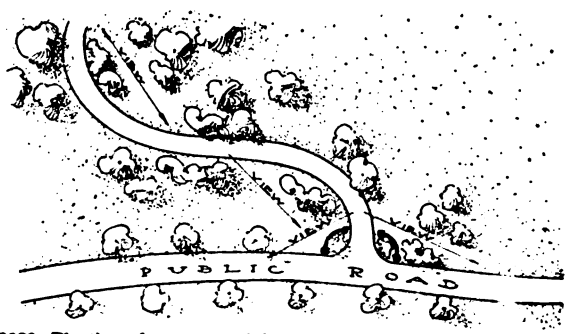
Driveways.

If walks and drives were not necessary to a human use of the informal type of landscape, they would never be put into it. Drives should be regarded as secondary, not primary elements of beauty in this style of gardening and they should remain unobtrusive by direction, width, and material. But as the landscape becomes more formal, drives become increasingly important and prominent in the design. It is simpler to plan a straight avenue in the formal balanced lawn of a house with terrace and gardens in a straight line swung on evident axes than to observe the indefinite lines, the less apparent unity and balance of informal gardening and incorporate therein a wide roadway. A straight formal drive should not be intruded through an informal lawn, or an irregularly curved and planted road through a formal place.

As elements of beauty, roads are tolerable only as they serve their purpose thoroughly well. This purpose may be a service-way to the kitchen, when directness is the first consideration; or to the front door, when good views of the house and lawn may warrant more indirectness; or a pleasure-drive, where directness is lost sight of, and good views, interest of scenery, and gradient become all-important. Success in laying out driveways depends on skill in applying the principles of landscape design, with a true regard for grades and excellence of construction. Mere engineering skill will not attain good private or park drives, for part of the function of such roads is to harmonize as far as possible with the other elements of the created or natural landscape.

Practical reasons urge a principal entrance toward the most-used corner of the property. As far as possible, the natural inclination for "short cuts" should always be recognized. Neither straight lines nor tiresome turnings are esthetically pleasing; grades must be considered and fine existing natural features, trees, rocks, and the like usually avoided. The driveways should command interesting views ahead and to the side and attract attention to handsome plantings in the curves. The curves should always be directed toward and not away from the objective point, and circuitousness for sake of adding mere length to the approach should be avoided.

To be comfortable as well as practicable, the gradient should be as low as about 6 per cent (6 feet of rise in 100 of length), at turns never over 7 per cent, although 10 or 12 may be required elsewhere to accomplish the ascent. Transition from one slope to another must be carefully arranged so as to avoid sharp jolts (Fig. 3979); this is accomplished by filling the hollows or cutting off the crests where the grades reverse. There should always be a flat place in front of doors and at entrances. Road-curves should be long, at least equal to 60 feet radii. It is an advantage to plot the curves at least roughly upon the ground first and transfer them to paper rather than vice versa, as their true artistic and practical effect may be perceived better. Long stakes should be used to aid the sight or a coil of rope laid upon the ground, and moved about until the desired line is attained, then the rope staked.



3980. Planting of curves, and free views. Entrance at right angle to highway.

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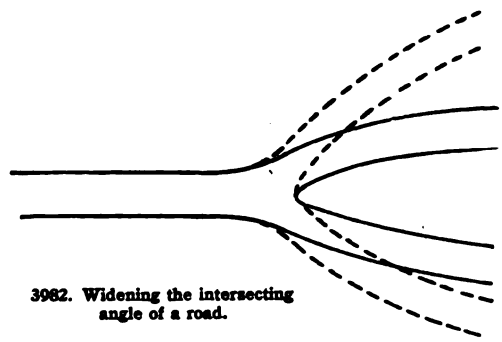
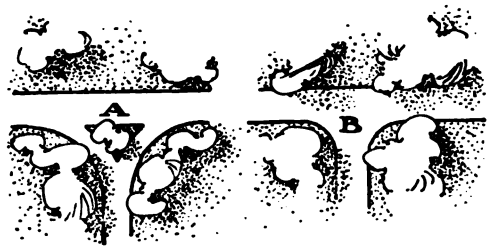
3981. Branching of road.



3982. Widening the intersecting angle of a road.

By tying colored twine around the stakes and moving it up and down while sighting, the new grades may also often be visualized. In cleared ground this method is very sure. It is better than the engineer's method of regular curves connected by straight tangents.

Precaution should be exercised at curves and intersections to secure safety as well as appearance and convenience. The fast-moving almost noiseless modern vehicles emphasize this precaution; therefore the view ahead at sharp turns should always be unbroken by banks or dense, tall plantings (Fig. 3980). Drives should branch on the outside (A) not inside (B) of curves (Fig. 3981). Danger lurks in narrow branchings and may be avoided by widening the intersecting triangle (Fig. 3982). Small triangles at right-angle intersections are not to be advised. When used at all they should be large and clear of tall planting which obscures the view. Triangles with less than 50-foot sides may better be omitted altogether (Fig. 3983).



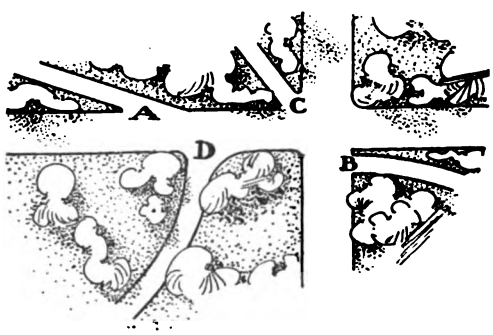
3983. Driveway with and without an undesirable triangle.

At the turn-in from the public road especial care must be exercised to avoid danger. The acute angle (A) is bad (Fig. 3984), and the corner entrance (B) is not much better, or is absolutely fool-hardy when arranged as C. The best turn-in is shown at D. When possible, enter from an outward bend of the public road (Fig. 3985) or at the head of the street (Fig. 3986), and always at nearly right angles to the public road (Fig. 3980), making a gradual bend, if desired, to an angle within the property. Avoid if possible the street entrance at the foot of a steep hill as it is the point of greatest speed. Formerly entrances were heavily emphasized by gate-piers, lodges, and tree-plantings; now they are recessed and the planting is less high.

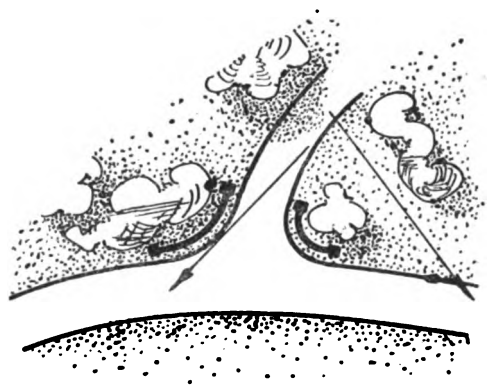
The road-surface should be smooth, dry, elastic, clean, and of good color. All this is to be obtained by various constructions. The gravel roadway is always pleasing as to color and wear, but the present-day macadam, although somewhat lacking as to color, better withstands modern traffic. Brick, concrete, and asphalt are too noisy and seem too hot and formal for private roads in the country, although for short distances in the city they may be used properly.

The construction of any roadway is begun by grading the level for the bottom of the road. This is called the sub-grade and is made higher in the center than at the sides by ½ inch or more to each foot width. The sub-grade should be rolled before the stone is laid. For private drives generally a light Telford consisting of native stone, about 6 inches wide and 1 to 3 inches thick, is laid by hand upon edge crosswise of the road. Over this a sprinkling of clay soil is thrown and covered 2 inches deep with crushed stone of the 1½-inch grade; this in turn is covered by an inch of crushed limestone screenings. Each course as laid is sprinkled and rolled with a six- to ten-ton steam roller. This is a water-bound macadam. (Fig. 3987 A.) Since it does not withstand automobile traffic without dust, various oil-binding treatments of the surface are on the market. Bitulithic macadam is an excellent method of binding the top courses together, with hot pitch applied under pressure. There is no tracking of oil when this method is practised and the color and texture are satisfactory. Local conditions so influence materials and methods that it is necessary to investigate before applying any general specification in detail.

A cheaper road (Fig. 3987 B) may be built of spawls, or other broken stone, spread evenly, rolled, and surfaced with the other two courses of crushed stone, each thoroughly rolled wet. Where gravel of a cementitious quality is obtainable, or a hard shale, it may be substituted for crushed limestone surfacing.



3984. Good and bad entrances from the public road.



3985. A good entrance from an outward bend of the road.

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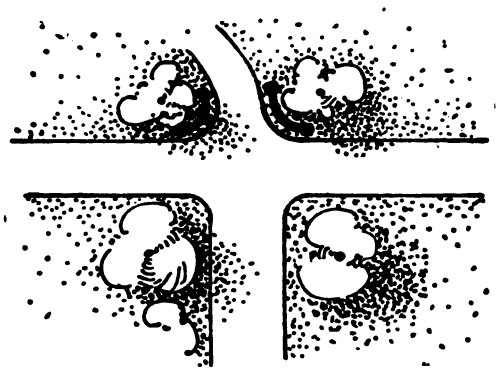
The earth road has its country uses. Its success depends on dryness, and this is brought about by wide ditching at the side, a rather high crown in the center, and puddling the surface by repeated dragging while in a wet condition. The turf road (Fig. 3987 C) in country estates, for occasional travel, is made by laying



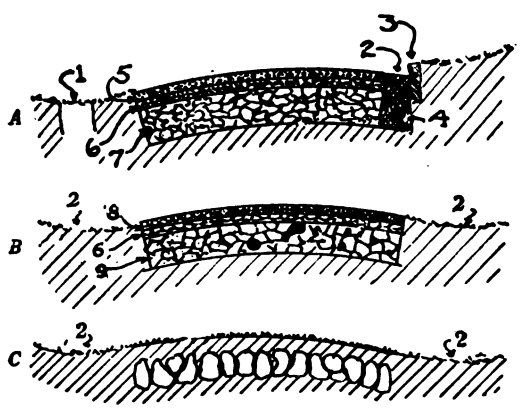
3986. A good entrance at the head of a street.

roundish stone without "chinking in" the interstices. Cover with soil 1 inch thick over top of stone and seed with grass.

Whatever material the road is made of, it should be of convenient although not of unnecessary width, 9 feet for a single suburban lot being sufficient, 13 to 16 feet, including gutters, for more pretentious places, 14 feet for the little-traveled by-roads in parks, and 22 to 30 feet for the principal drives, and 60 to 80 for boulevard widths. The roads should also partake of the decoration suited to the large feeling of the place. Such accessories as gutters and inlets, signs and light-posts, entrance-piers and gates, should be rustic or more refined, carved or conspicuous in proportion as the surroundings have been conventionalized. Roads must harmonize and obey the demands of unity in design. The use of roadside shrubbery and arrangement of taller-growing trees is the means whereby the designer may tie together an artificial road to the landscape.

ARTHUR W. COWELL.

WALLFLOWER. The vernacular name of *Cheiranthus Cheiri*, which see. A favorite spring bloom in Great Britain, and sometimes secured as early as Christmas; in this country it is little known, probably because of climatic reasons.



3987. Types of road construction: *A*, macadam; *B*, broken stone; *C*, turf; *1*, sod gutter; *2*, gutter; *3*, stone curb; *4*, cinders; *5*, screenings; *6*, 1½-inch crushed stone; *7*, Telford; *8*, screenings or gravel; *9*, spawls.

The wallflower is a perennial, blooming profusely the second year, but needing to be renewed frequently. The compact forms grow only 1 foot or 18 inches high, but some kinds are taller than this. There are single-flowered and double-flowered kinds, and colors in yellow, orange, blood-red, maroon-red, yellow-brown, light brown, ruby-purple, pink. The yellows are most commonly seen in English gardens, and make a most attractive show about cottages in early spring. The double kinds are propagated by cuttings taken in spring, and they make good blooming plants the following spring if not allowed to become stunted; double wallflowers are also grown from carefully selected seeds. The seeds of wallflowers may be sown in spring and plants are kept in vigorous condition until protected for the winter; they are transplanted when young into permanent beds. If seeds are started in late winter, bloom may be had in the following holidays, in a climate mild enough to carry them.

WALLÍCHIA (Nathaniel Wallich, 1786–1854, Danish botanist; wrote on plants of India). *Palmàceæ*. Stove palms, one of which, the first described below, is cultivated outdoors in southern Florida and southern California and in Europe under glass, and the second, while not advertised in America, is probably in a few northern greenhouses.

Low palms, cespitose, with short branching caudices, or in 1 species tall: lvs. densely fasciculate, terminal, distichous, scaly, unequally pinnatisect; segms. solitary or the lowest in groups, cuneate at the base, oblong-obovate or oblanceolate, erose-dentate, the terminal one cuneate; midnerve distinct; nerves flabellate; margins recurved at the base; petiole slender, laterally compressed; sheath short, split, with the margins deeply crenate: spadices short-peduncled, the staminate drooping or recurved, ovoid, much branched, densely fid., the pistillate looser, erect; spathes very numerous, slender-coriaceous, the lower ones the narrower, tubular, the upper ones cymbiform, entire, imbricated: fls. symmetrical, the pistillate much smaller than the staminate, yellow: fr. ovoid-oblong, red or purple.—Three species, Himalayas. Wallichia is allied to Didymosperma, Arenga, and Caryota, differing in having 6 stamens instead of an indefinite number. Caryota is the only one of this group with ruminate albumen. Didymosperma has a cup-shaped 3-lobed calyx, and in Arenga the calyx has 3 distinct sepals.

dísticha, T. Anders. Fig. 3988. Caudex 10–15 ft. high, about 5–6 in. diam.: lvs. graceful, 6–10 ft. long, alternate, erect; lfts. 1–2 ft. long, 2–2½ in. wide, fascicled, linear, narrowed to the base, denticulate at the apex, with a large tooth on each side above the middle, glaucous beneath; petiole and sheath short, scurfy; lvs. disposed in a one-third spiral: spadix 3–8 ft., the staminate usually twice as long as the pistillate: fls. in many spiral series, green. Himalaya.

caryotoides, Roxbg. (*Harìna caryotoìdes*, Buch.-Ham. *Didymospérma caryotoìdes*, Hort.). St. very short or none, often sheathed with the persistent lf.-bases: lfts. oblong or linear-oblong, panduriformly excised and acutely toothed, white beneath: spadix about 18 in. long, the fls. purple or yellow, according to sex. F. 1874, p. 161. R.H. 1870, p. 368.

W. densiflòra, Mart., a palm like W. caryotoides and differing only in technical ovary characters, is offered in Eu. Unknown in Amer. J.F. 3, pls. 233, 234.—*W. porphyrocárpa*, Mart. See Didymosperma.

JARED G. SMITH.
N. TAYLOR.†

WALNUT (formerly sometimes written *wallnut*, but the name has no connection with *wall*, being rather of Anglo-Saxon derivation signifying "foreign nut," as the product came from the continent). A name applied to *Juglans regia* and its fruit, to us known mostly as

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English walnut because the supply yearly reached America through England; also, by extension, to other species of the genus Juglans. The name is sometimes, but provincially, given to hickory-nuts.

The walnuts may be thrown into three horticultural groups: (1) The Persian or English domesticated species, *Juglans regia* (Fig. 3989), the walnut of commerce and of extensive cultivation in California and other parts of the United States. (2) The North American walnuts, of several species but chiefly known in the black walnut, *J. nigra* (Fig. 3990). (3) The East Asian walnuts, represented by *J. Sieboldiana* and allies, promising but yet little grown in this country. To the genus also belongs the butternut, *J. cinerea* (Fig. 3991), sometimes called white walnut. There is much promise of important cultural races in the species of Juglans, but the markets yet know practically only the nuts of *J. regia*. See *Juglans*, Vol. III.

L. H. B.

The walnut in California.

The extent of the present Persian or English walnut (*J. regia*) industry of California amounts to between 45,000 and 50,000 acres, or about 1,250,000 trees. An average crop for the past few years is about 12,000 tons, valued at $3,500,000. The crop for the year 1915 equaled 14,300 tons, valued at approximately $4,250,000 to the growers. The investment in the walnut industry of California represents about $45,000,000.

English walnuts may have first been planted in California by the Mission Fathers. However, it was not until after the coming of the first Americans that this industry attained any commercial importance. The present walnut industry is of comparatively recent origin and owes its establishment to the early efforts of Joseph Sexton, of Santa Barbara, and the late Felix Gillet, of Nevada City. The Santa Barbara Soft Shell seedlings and the several grafted varieties of this type all trace back more or less directly to the efforts of Sexton. The French varieties, such as the Mayette, Franquette, and the like, owe their popularity to the tireless work of the late Gillet in promoting the production of this type of walnut.

Commercial walnut-growing is largely centralized in the following counties mentioned in their order of importance: Orange, Los Angeles, Ventura, Santa Barbara, San Joaquin, and Contra Costa.

This industry is almost everywhere a specialized crop. It is seldom seen as one of two or more general farm crops, but, on the contrary, nuts are the one and only crop produced by many of the orchardists engaged in this industry. Success with this crop depends on the soil and climatic conditions and the availability of irrigation water. A deep rich alluvial loam containing plenty of humus is desirable. Groves planted on the light sandy loams or soils underlaid with a fluctuating water-table or a hardpan within 4 or 5 feet of surface are usually short-lived and unsatisfactory in the end. Although good drainage is imperative to a depth of at least 6 or 8 feet, irrigation water is necessary throughout most of the walnut areas of California for the best production of nuts.

The walnut industry has been most successful throughout the coast regions. In general, the high humidity and frequent fogs, together with a relatively small daily range in temperature, seem favorable to this crop. Walnuts grown inland are subject to sun-scald injury on both the nuts and the trees. The inland regions are subject to a very low humidity, an extreme maximum temperature and a wide daily range. Some of the more recently introduced varieties seem to endure the inland conditions better than the Santa Barbara Soft Shell seedlings. It seems very likely that the inland valleys may yet be devoted to this crop with the proper choice of varieties.

Clean culture, with the use of a winter cover-crop, is the most prevalent type of soil-management practised by the progressive growers. Such cover-crops as melilotus clover, vetch, and rye are often seen. These crops are usually planted immediately after harvest, the latter part of September or October, and should be nearly waist-high at the time they are plowed under, in the latter part of March or April.

3988. Wallichia disticha.

Irrigation water is applied by the furrow system in most cases, although occasionally a grove is watered by the basin method, where the land is level or where possibly a sod is grown in the grove throughout the year. From one to five or six applications of water are made in a season, depending on the moisture-holding capacity of the soil and local climatic conditions. Each irrigation should penetrate from 6 to 8 feet from the surface of the ground in order to reach the entire root-system. If the trees are irrigated a week or two before harvest, the shucks will open and remain on the trees, dropping the clean nuts to the ground. In case the trees are drought-stricken at harvest, the shucks are likely to become sunburned, stick to the nuts, and thus cause an increase in harvesting expense.

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The larger number of growers do very little systematic pruning of the walnut except to remove the lower limbs which interfere with cultivation. Occasionally, however, a grove is to be seen in which the branches are annually thinned out. Such trees usually bear more nuts on the main limbs near their centers than the unpruned ones.

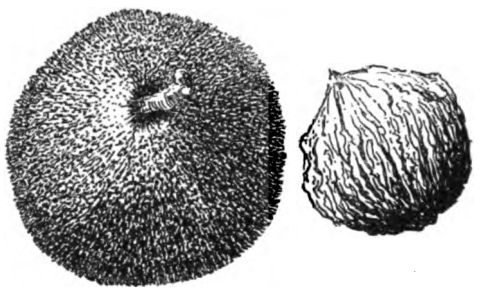
Companion crops in bearing groves are seldom seen, and in fact young groves, before they reach a bearing age, are sometimes handled with clean cultivation. The interplanting of young walnut groves with lima beans or other hoed vegetable crops, small-fruits, alfalfa, and occasionally apricots and peaches, is a common practice. Certain intercrops, as beans, if properly handled, will commence making returns immediately without detriment to the future walnut grove. Vegetable crops are preferable to tree crops for interplanting. Peaches and especially apricots have an apparent dwarfing effect on the young walnut trees. Their use may be profitable, however, in the end in spite of the injury caused.

The older plantings of walnuts were set too close together. Although 40 to 50 feet apart seemed ample room for development, it is very evident now that a distance of 60 feet is none too much for the larger-growing varieties on the rich loam soils which are best adapted to this crop. It is a matter of common observation to see the outside trees in a grove produce considerably more than the trees in the center. This leads one to believe that perhaps some of the older plantations might produce more walnuts today with fewer trees to the acre.

The older groves are composed entirely of seedlings, most of which are of the Santa Barbara Soft Shell type and trace directly or indirectly to the original trees grown by Sexton at Santa Barbara. It is only within a comparatively recent time, during the last ten to fifteen years, that the walnut has been propagated by budding and grafting in commercial quantities. During this time, a comparatively large number of varieties have been introduced and many of these have been discarded even thus early in the development of the industry. At the present time the following five varieties are being propagated to a greater extent than all other sorts combined: Placentia, Eureka, Franquette, El Monte, and Prolific. In general, the first two mentioned varieties compose nearly 70 per cent of the trees propagated at the present time in southern California nurseries.

3989. Juglans regia, the walnut of commerce. Often known as "English walnut."

The several black walnuts are used as rootstocks. The northern California species (*J. Hindsii*) is held in the greatest favor at present. This is a strong vigorous tree which will withstand adverse soil conditions much better than the Persian walnut itself. Very few eastern black walnuts (*J. nigra*) are used for propagation, as they are usually thought to be less vigorous than California species. The southern California black walnut (*J. californica*) is little used at present, although it was once popular (Fig. 3992). This species starts growth so much earlier in the spring than the Persian walnut that it suckers profusely when used as a rootstock. It is not so rapid-growing as the *J. Hindsii*. Some of the nurserymen are using the Royal hybrid as rootstock. The Royal hybrid is the name commonly given to a cross between *J. nigra* and either of the California species. Some observers think the Royal hybrid root more resistant to excessive soil-moisture and general adverse soil conditions than any other rootstock. The Paradox hybrid, which is a cross between *J. regia* and any of the black species, is an exceedingly vigorous rapid-growing tree. This hybrid can be obtained by planting black walnuts which were produced in the neighborhood of *J. regia* trees. Such nuts will produce from 50 to 90 per cent hybrid progeny. Although this hybrid makes an excellent root and produces an exceptionally large and vigorous tree, it is rather impractical for general use as it cannot be obtained in wholesale quantities.



3990. Black walnut.—Juglans nigra. On the right is the bare nut; on the left the husk not removed. (×½)

The nursery propagation of walnuts is usually by crown-grafting in place. The black walnut root is grown one year in the nursery and grafted the second spring just before the leaves start to come out. A short whip-graft is used, tied in place by soft cotton twine or raffia. After tying, the graft and top of the cion are covered thoroughly with hot wax. Some additional protection is usually given to prevent the cion drying out excessively. This is done by covering with a paper bag or by hilling the soil over the union until growth starts. The young trees are staked in the nursery, as they are very supple, due to their rapid growth. The one-year-old trees are preferred by most planters and should be 6 to 10 feet high at this age. As the trees are set in the orchard, they are usually cut back to about 5 feet. Some growers in the inland sections, however, prefer to cut the trees back to 18 inches and then train one sprout from the trunk of the tree. This sprout is pinched back when it reaches a height of 5 feet. The method necessitates staking the trees. At the end of one season's growth such severely headed-back trees may be as large as though they were left 5 feet high in the beginning. The trees cut back to 18 inches grow much more vigorously than trees only moderately pruned.

The harvesting of walnuts is done largely by Mexican families who camp in the groves through the picking-season. A portion of the nuts fall naturally to the

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ground and the remainder are shaken off by means of hooks attached to long poles. The pickers receive from 80 cents to $1 for 100 pounds for gathering the nuts and placing them in barley sacks. The nuts ripen through a period of a month or six weeks; therefore two or three pickings are made, followed by a gleaning of scattered nuts.

3991. Juglans cinerea of the eastern states. Sometimes known as white walnut. (×⅓)

The nuts are washed, dried (Fig. 3993), culled, and sacked on the farm. They are then delivered to a central packing-house to be bleached. This is accomplished by spraying with electrolyzed salt-brine, or dipping in a solution of chloride of lime and sal soda, to which sulfuric acid is added. Either process removes all discoloration from the shells and gives them a bright light tan color, attractive in appearance. There are many ways of handling the nuts after bleaching to hasten their drying. Some packing-houses pass the nuts through a warm air-current in long drums, thence they are elevated to the bins, where they arrive nearly dry enough to sack. Other houses dry the nuts for about twenty-four hours in wire or lath bins. By putting each grower's nuts into several bins as the nuts come from the bleacher, and then drawing from several bins at the time the nuts are sacked, a thoroughly mixed uniform product is packed in each bag. Each bag contains 100 pounds of nuts.

The grading of California walnuts has developed rapidly within the last decade, as compared with sales in the past of seedling nuts ungraded and unbleached, as plain walnuts; the grading has gradually reached a stage where part of the nuts are sold under their variety name and another larger portion is disposed of after being bleached and strictly graded according to size, shape, color of the meat, and quality of same. The California Walnut-Growers' Association has recently introduced a one- and two-pound carton and has standardized the product handled in this package as strictly as breakfast foods and canned goods are graded and packed.

Although the walnut industry has not an established reputation for profitableness which is comparable with citrous fruits of California, it has nevertheless maintained its position as a stable, conservative, permanent crop within this state. The income to the acre for this product will vary widely according to variety, soil, and climatic conditions as well as the personal element of management. Such incomes will fluctuate from $100 to $300 an acre. Whereas the average yield of walnuts for the state is between 800 and 1,000 pounds, the better groves will average from 1,500 to 2,000 pounds to the acre annually.

The future development of this industry seems to be drifting gradually inland, giving way in Orange and Los Angeles counties to citrous culture. The inland valleys were formerly thought to be poorly adapted to walnut-production because of the darkening of the meats by the intense hot sunshine; however, there are several sections which give promise for development along these lines with the proper choice of varieties adapted to these particular environments.

The walnut industry enjoys one of the most notable features of any fruit industry of the country, inasmuch as its product may be successfully stored awaiting disposal for a period of at least twelve months if necessary. This has given the industry a very stable character and has freed this product from the speculative manipulations which are frequently found in connection with the perishable fruit products. It is interesting to note that the importations of walnuts into the United States have gradually increased during the last ten years and within this same period the total production and the prices to the growers of California have also gradually increased. This may be taken as only one of many indications that the walnut is being looked on more and more as a necessary food by the people of this country.

From present indications, this industry is less liable to the dangers of over-production than almost any other agricultural or horticultural crop within the borders of the state.

The chief insect and fungous troubles of the walnut are the walnut aphis, and also the walnut blight or bacteriosis (*Pseudomonas juglandis*). The aphis may be controlled by means of tobacco sprays; this is rarely done, however, as the damage is only occasional. There is no means of control known at present for the blight or bacteriosis (Fig. 3995). The wide variation among seedling trees in their susceptibility to the disease gives promise of eventual relief through the selection of blight-resistant varieties. Minor losses are due to red-spider, codlin-moth, and melaxuma.

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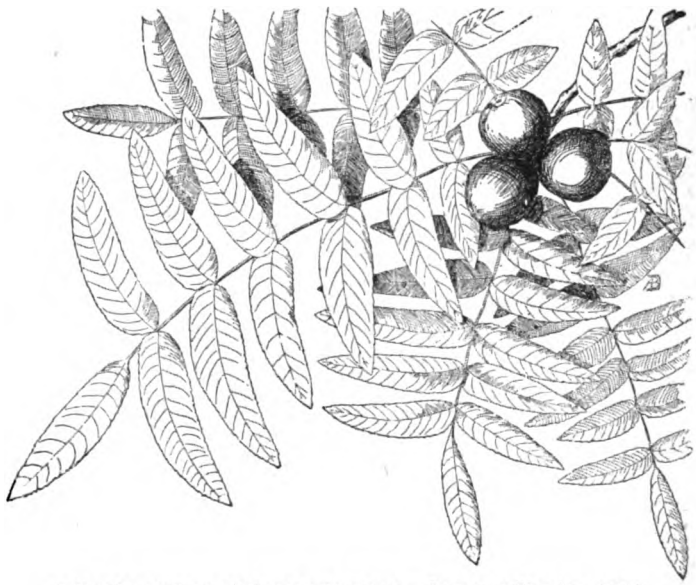

3992. The southern California wild walnut.—Juglans californica. (×¼)

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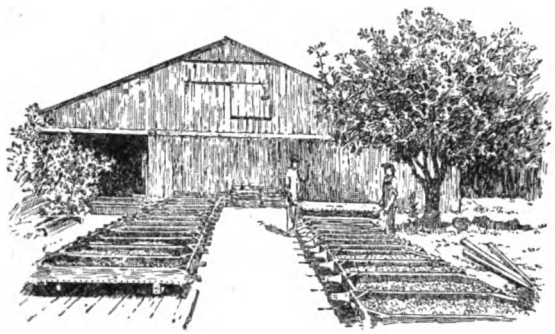
(1913). Davidson, W. M., "Walnut Aphis in California," United States Department of Agriculture Bulletin No. 100 (1914). Tylor, A. R., "Spraying for the Control of Walnut Aphis," University of California Circular No. 131 (1915). Fawcett, H. S., "Melaxuma of the Walnut," University of California



3993. Drying walnuts in California.

Experiment Station Bulletin No. 261 (1915). Batchelor, L. D., "Problems in Walnut Breeding," Journal of Heredity, Vol. VII, No. 2 (1916). L. D. BATCHELOR.

Commercial possibilities of walnuts other than Persian in the United States.

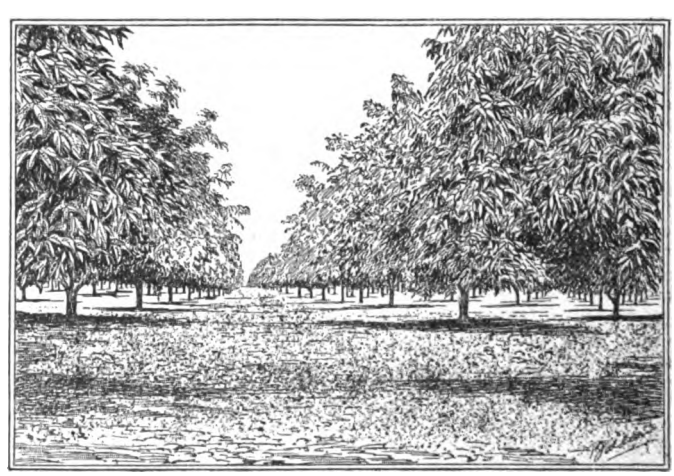
Theoretically, the commercial possibilities of a number of walnut species in this country are large and encouraging. The genus Juglans, to which all true walnuts belong, either as native or as planted trees, covers practically every cultivated section of the United States wherever suited to hardwood growth. Apparently some of its representatives may be taken to many new small localities where it is now not found. The nuts of practically all species possess kernels rich in food properties and exceedingly pleasing to the taste. Most of its species are fairly rapid growers and develop into shapely trees. Rightly chosen and well cared for, they may be used most effectively as ornamentals and as nut-producers at the same time. The eastern black walnut, *Juglans nigra*, is exceedingly valuable for timber purposes, and its planting is now strongly urged by the foresters; to a large extent the various native walnuts and their hybrids make the best stocks now available for the Persian walnut.

Practically, there is little doubt but that each of these species will ultimately be developed for purposes of nut production, although in common with most new industries the progress will be slow and beset with more or less disappointment. It should be borne in mind that these walnuts are wild and uncultivated species and cannot be expected to respond to cultivation with the same readiness as species which have been selected and cultivated for centuries.

The principal problem now before the prospective planter appears to be one of varieties. It is well established that seedlings vary greatly in all essential characteristics and, therefore, are less desirable than are budded or grafted trees of suitable varieties. However, to date, there are fewer than a half-dozen varieties of black walnuts offered by the nurserymen, and so far as generally known, there is none of butternuts or other kinds of walnuts, exclusive of Persian. Therefore, for the present, planters must depend very largely on seedling trees, for which, although they are generally condemned by the leading horticulturists, there are at least four substantial reasons for using, as follows: (1) Budded and grafted trees are as yet offered by the nurserymen only to a very limited extent; (2) the available varieties are new and practically untried; (3) the prices necessarily asked by the nurserymen are beyond the reach of many who would otherwise plant walnut trees; (4) desirable varieties are liable to result from the planting of nuts from choice trees.

Definite steps are now being taken toward the development of these species and already some distinct progress has been made; but as yet it is very doubtful whether commercial planting of trees of any species of Juglans, other than *J. regia*, for purposes of nut production alone, is to be recommended. In general, it is unwise to attempt the growing of trees for the dual-purpose of timber and nut production, as for the former, the trees should be set close together in order to induce the development of long trunks with a minimum of top, while for the latter purpose, they should be given orchard space between in order to allow for the development of low heads, large tops, and a maximum fruiting surface. But in view of the uncertainty of outcome with any of the present available varieties and the value of black walnut timber, it is possible that trees of this species might wisely be planted at one-half or one-quarter the usual orchard distances apart, with the idea of allowing them to become forest trees, if for any reason the nuts should not justify their retention for orchard purposes. It is very doubtful whether any other species of walnut could be recommended for such use, as with the possible exception of the two forms of hybrids common in California, Paradox and Royal, no other species of walnut is now being seriously considered for forest-planting and, except in rare instances, neither of these Californian forms produces nuts of value in commercial quantities.

Without doubt, the most promising place for walnut planting at the present time is about the home grounds, both in the city and in the country, and along the fence-rows everywhere. Very often walnuts yielding both beauty and product could as well be planted as trees of other species capable of affording beauty and shade only. In the country, few grounds are so crowded that there is not room for a few walnut trees, which could be procured at small initial cost and which could be developed into useful trees at practically no further expense. If one-quarter of the American farmers were to plant even two walnut trees about their premises, it is difficult to estimate what would be the aggregate increased value to such farms by the end of a



3994. Walnut orchard in southern California.

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quarter-century, but certainly it would be very appreciable.

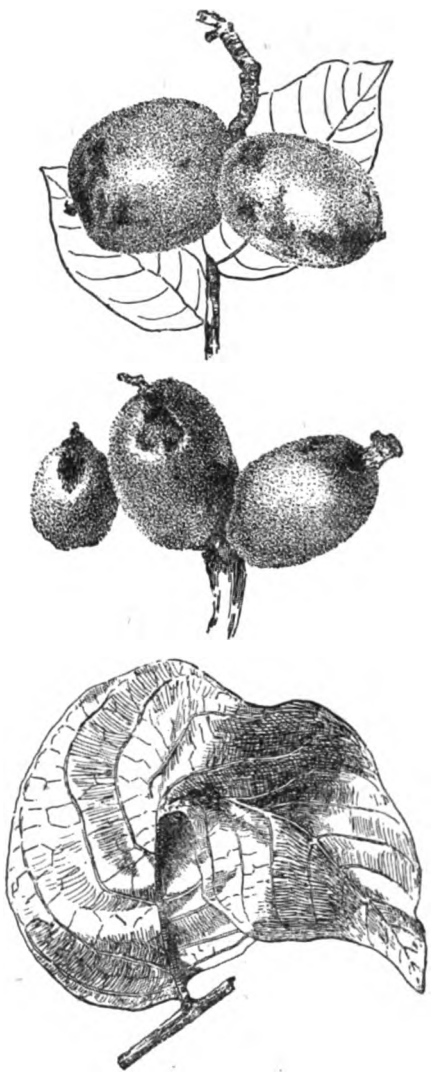
Among the species of walnuts not usually under cultivation, but which give promise of commercial possibilities, some are discussed in the following:

The American black walnut, Juglans nigra.

As a producer of marketable nuts, this species now gives greater promise than does any other secondary species of Juglans. Its natural range extends from middle New England to north Florida, in the east, and from Minnesota to Texas on the west. Although best suited to deep fertile loams, moist yet well drained, it readily adapts itself to conditions less favorable. It attains its best development in the basin drained by the Ohio River but is common at practically all altitudes in the eastern states up to about 1,400 feet where it is superseded by the butternut. The tree is a symmetrical and fairly rapid grower; usually moderately productive and very useful both in the landscape and as a forest tree. The nuts usually are thick-shelled, and it is seldom that the kernels can be separated from the cracked shell in perfect halves. A few varieties, the kernels of which crack out more or less perfectly, are now listed by the nurserymen. The two best known are the Thomas, introduced from Pennsylvania in the early eighties, and the Stabler from Maryland in 1915.

The butternut, white or long walnut, J. cinerea.

In many respects, this species is similar to the preceding. Its northern range is somewhat more extensive than is that of the black walnut and its southern and western limits are less by about 300 miles. The tree is shorter-lived, not as symmetrical in form, nor as capable of adapting itself to unfavorable conditions, and the timber is of inferior value to that of black walnut. The nuts have thicker and rougher shells and are more difficult to crack but the kernels are more readily separated from the broken shells in perfect halves than are those of the former species. By many, the kernels of the butternut are much preferred to those of any other nut.



3995. Blight or bacteriosis of the walnut, as shown on fruits and leaves.

The Japanese walnut, J. Sieboldiana.

This species and its variety *cordiformis*, described in Vol. III, page 1723, as there explained do not breed true to type but revert to each other or to intermediate forms, and not infrequently to a type, the nuts of which are often practically indistinguishable from those of the butternut. These forms are now fairly common throughout much of the eastern and southern United States. The trees are dwarfish in habit, broadly spreading, ornamental, precocious, and usually prolific. A few varieties have been recognized and propagated to a limited extent, but so far as can be ascertained, none is now listed by the nurserymen. However, enough good strains may now be selected to cover practically every section of the United States, with the possible exception of the dry Southwest. The nuts vary in size and form, but typically are broadly rounded at the base, conical, and smaller than are those of *J. nigra*. When struck with a hammer, they tend to open at the suture, thereby breaking both half-kernels into quarters. Frequently, nuts of the cordiformis type open automatically at the apex, and with the aid of a knife-blade, the half-shells may be separated entirely and the whole kernel removed without breaking. In color, texture, and flavor of kernel, the Japanese walnuts are very similar to those of the butternut, *J. cinerea*.

Miscellaneous species of Juglans.

A species from northeastern China (*J. mandshurica*), the nuts of which are intermediate in form between those of *J. cinerea* and *J. Sieboldiana*, was introduced into the United States some years ago but is not yet sufficiently well tested to make possible a definite report. It should be hardy and therefore of value in the northern states. Aside from those already included, there are a number of species of Juglans which are more or less common in parts of the United States, but all are of minor importance, so far as nut production is concerned, and apparently of use only in sections where the better species are unadapted and as stocks for superior varieties. Among such are included *J. californica*, *J. Hindsii*, *J. major*, and *J. rupestris*. For full accounts of these species, see Vol. III, pages 1721 to 1724.

Juglans hybrids.

The various walnut species so freely interpollinate, when grown in close proximity to each other, that when pure strains are desired it is not safe to plant the nuts where there is danger of such pollination having taken place. The familiar Paradox and Royal of California, crosses of *J. regia* with any species of black, and of any California black with the eastern black, respectively, are typical examples of such natural hybridity. In the East, there are numerous crosses of *J. regia* with other species, viz., *J. intermedia* (*J. regia* × *J. nigra*); *J. quadrangulata* (*J. regia* × *J. cinerea*); and one between *J. regia* and *J. Sieboldiana*, which apparently has not yet been described. Frequently, individual trees of these forms are sturdy growers and make valuable stocks for other species, as already noted, but usually they are practically nonproductive and of little value to the orchardist.

C. A. REED.

WANDERING JEW: ***Zebrina pendula*** **and** ***Tradescantia fluminensis.*** The common purple-leaved wandering jew of greenhouses, with pink flowers that open in sunshine, is *Zebrina pendula*, often confused with Tradescantia.

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WARDIAN CASE. A nearly air-tight case with glass sides and top, used for transporting growing plants on long sea voyages, invented about 1836 by N. B. Ward, who wrote a book of ninety-five pages "On the Growth of Plants in Closely Glazed Cases," published at London in 1842. It provides the best and safest method of transporting potted and living plants across the ocean, as it insures the necessary light, protects the plants from salt spray and foul gases, and requires a minimum of care, as the plants need no watering. Such cases maintain nearly uniform conditions of temperature, moisture, and atmosphere. Similar cases are used in greenhouses for growing filmy ferns, dwarf foliage plants, and other small specimens that require a very moist and close atmosphere and invariable conditions.

WARPÙRIA (named after G. Warpur, who collected the genus). *Acanthàceæ*. Low perennial greenhouse herb, branching from the base: lvs. opposite, approximate, entire or nearly so: fls. minute, white, in dense many-fld. cymes, head-like, long-peduncled, collected in the axils; calyx hyaline, 5-parted, segms. narrow, posterior 3 distinct nearly to their base, anterior 2 connate to their middle; corolla-tube rather cylindrical, limb minute, lobes 5, rotundate; stamens 4; disk annular; ovary 2-celled, cells 2-ovuled: caps. oblong, the upper third contracted into a beak.—One species, Madagascar.

3996. Warscewiczella discolor. (×¼)

clandestìna, Stapf. Plant about 4–5 in. high, pilose: st. short, prostrate or ascending: lvs. petioled, oblong or oblong-lanceolate, 2½–3 × ¾–1¼ in., acute or subacute at both ends: peduncles declinate, densely canescent; head ½–1 in. diam., white-pilose: calyx-segms. triangular-subulate from the base; corolla white, limb minute. Madagascar.

WÁRREA (named for Frederick Warre, who discovered the first species in Brazil). *Orchidàceæ*. Plants with the habit of small forms of Phaius. Lvs. few, long, plicate: scape tall, bracted, bearing a raceme of terminal showy fls.: sepals and petals subequal, concave, the lateral sepals united with the base of the column; labellum not spurred, united with the base of the column, undivided, concave, with longitudinal ridges; column without appendages; pollinia 4, with a narrow stipe. —Two species, Peru and Colombia. They require the same treatment as phaius.

bidentàta, Lindl. (*W. Lindeniàna*, Henfr.). Labellum regular, slit at the end; ridges convex, the central ones thinner and deeper: bracts one-fourth as long as the pedicels. Sept. Venezuela and Colombia. A.F. 6:655.

W. cyánea, Lindl.=Aganisia cyanea.

HEINRICH HASSELBRING.

WARSCEWICZÉLLA (from J. von Warscewicz, a Pole, collected in S. Amer. for Van Houtte; died 1866 in Cracow). *Orchidàceæ*. Orchids suitable for a cool-house. Fls. solitary, large, on a peduncle; sepals and petals similar, the lateral sepals forming a chin; lip jointed to the foot of the column, 2–5-lobed, with erect side lobes; and a transverse plate free from but lying upon the middle lobe; pollina 4.—About 10 species, from Costa Rica to Colombia and Peru. By some included in Zygopetalum.

discolor, Reichb. f. (*Wárrea discolor*, Lindl. *Zygopétalum discolor*, Reichb. f.). Fig. 3996. Lvs. narrowly lanceolate, jointed, 9 in. long: scapes 1-fld., shorter than the lvs.: sepals spreading, lanceolate, white; petals shorter, ovate, white with a tinge of purple, half-spreading; labellum large, broadly obovate, somewhat convolute, white, changing to deep purple toward the disk, and having a whitish or yellowish crest. Cent. Amer. B.M. 4830.

Wéndlandii, Hort. (*Zygopétalum Wéndlandii*, Reichb. f.). Lvs. tufted, lanceolate: fls. 4–5 in. across, solitary, on a scape 3–4 in. long; sepals and petals lanceolate, somewhat twisted, greenish white; labellum ovate, cordate, undulate, white, streaked and spotted with violet-purple; apex revolute, crest semi-circular, violet-purple.

W. aromática is offered by Lager & Hurrell. Apparently little known. Described as having white fls., with an azure lip, white-bordered. Said to come from Costa Rica.

GEORGE V. NASH.

WASHINGTÒNIA (named for George Washington). *Palmàceæ*, tribe *Córypheæ*. Tall North American palms, making noble specimens for planting in California and similar regions.

Trunks clothed above with remains of the sheaths and petioles: lvs. terminal, ample, spreading, orbicular, flabellately plicate, lobed nearly to the middle; segms. induplicate, filamentous on the margins; rachis short; ligule large, appressed; petiole long, stout, plano-convex, very spiny along the edges: spadices long, copiously paniculately branched, glabrous: branches slender, flexuous; spathes long membranous, split, glabrous: fls. white: fr. small, ellipsoid, black drupe, with a thin and sweetish rather dry pulp; seed brown, oblong to oblong-ovate, flattened, excavated or wrinkled on the raphal face.—Species 3, now recognized, Ariz., S. Calif., and Mex.

Probably the oldest use of the generic name Washingtonia is by Rafinesque in 1818 for the umbelliferous plants commonly known as Osmorrhiza; it was also once proposed for the Sequoias; and the name Neowashingtonia has been advanced for these palms. However, the use of Washingtonia for the palm is too well established to warrant the change. Parish, who has recently studied these palms, retains the name Washingtonia as the only tenable one, discarding the name Washingtonia when applied to the sequoias and also when used for the osmorrhizas on what he considers to be sound nomenclatorial grounds (Bot. Gaz. 44, pp. 408–434, 1907). His systematic treatment of the genus is followed in the present account.

The washingtonia that is best known in the wild is *W. filifera* var. *robusta*. The finest grove occupies the narrow palm cañon for a mile or more, 22 miles east of

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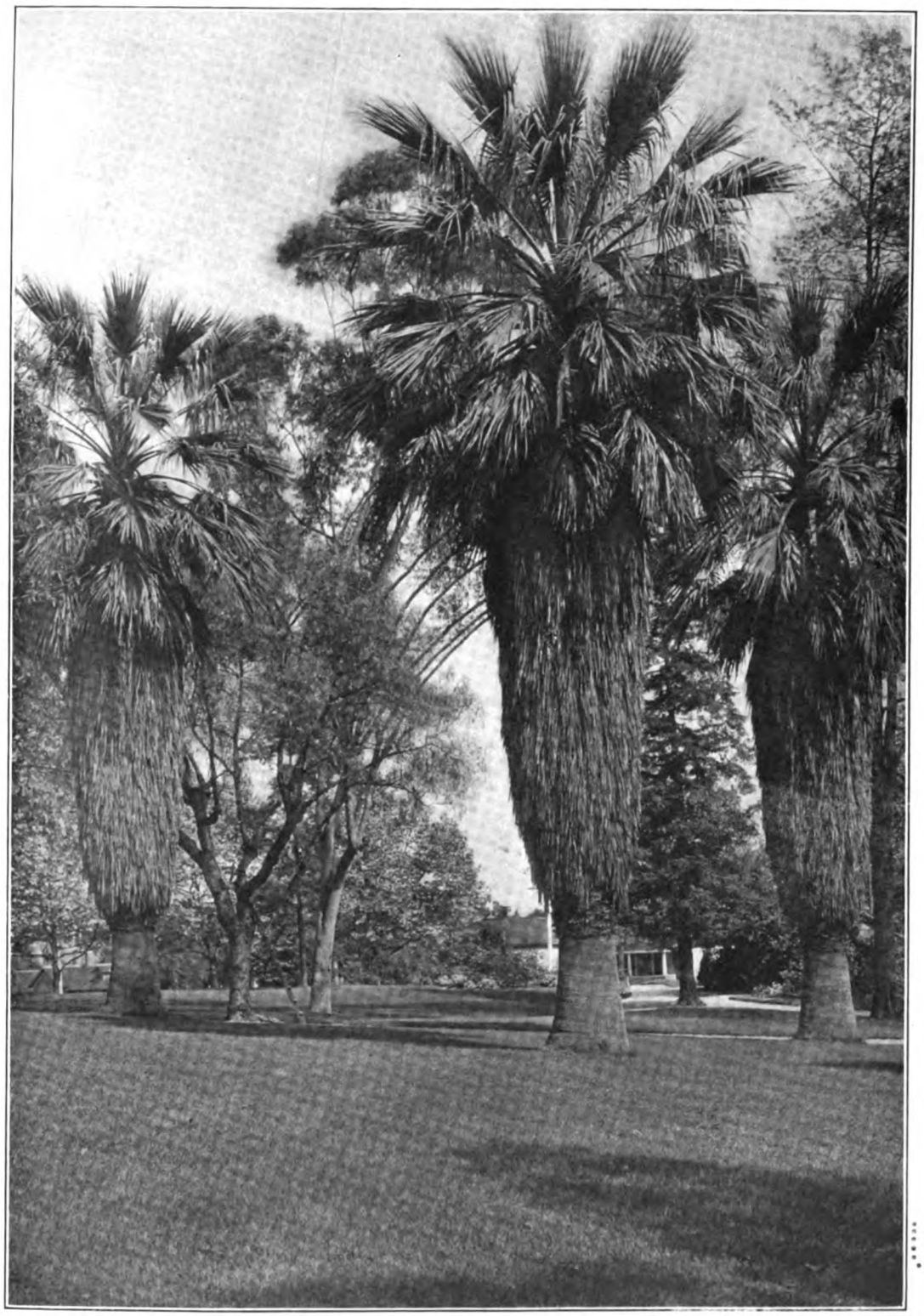

CXVIII. Washingtonia filifera var. robusta.

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Banning, Riverside County, California. This is the largest group of indigenous fan palms in the United States, and the only grove of important size on the Pacific side of the United States. The grove contains thousands of trees, some of them nearly 100 feet high. There are many young ones of all sizes and the older trees are still vigorous. Most of the cañons of the desert bases of San Jacinto, according to Parish, contain these palms; and a few grow in the cañon of the White Water River, which is the western limit of the species. The southern limit is probably Carrizo Creek, San Diego County, and the northern at Corn Springs in San Bernardino County. Except in trees protected in cultivation, old specimens are rarely seen bearing the great shaggy mass of dead hanging leaves, for they are burned off by Indians or take fire by accident; even in cultivated trees, the mane is usually cut away to give the plants a neater appearance but much of the characteristic beauty of the palm is then lost. Parish writes that "the functional life of a leaf is about one year. How long the dead leaves would remain attached to the trunk if undisturbed cannot be stated; probably for a very long period."

The washingtonias are much planted in California, thriving even in the climate about San Francisco Bay. In southern California they attain great size and comprise a characteristic feature of the landscape. They grow readily from seeds, but the trunks rise slowly. Two species are commonly planted, *W. filifera* var. *robusta*, with leaves bearing many filaments or threads on the edges and in the sinuses, and *W. gracilis* which is practically devoid of filaments.

A. *Petiole prolonged into the blade with an acuminate point.*
  B. *Blade of lf. abundantly supplied with threads or filaments* ..... **filifera**
  BB. *Blade nearly or quite destitute of filaments or threads* ..... **gracilis**
AA. *Petiole obtuse at its top where it joins the blade* ..... **Sonoræ**

filifera, Wendl. (*Brahea filamentosa*, Hort. *B. filifera*, Hort. *Pritchardia filamentosa*, Wendl. *P. filifera*, Hort.). Margins of the petioles armed up to the middle or somewhat beyond with stout hooked spines, but naked above: st. cylindrical, 20–40 ft., enlarged at the base (2–3 ft.), covered with persistent petiole-bases: petioles 2–5 ft. long, 1–2½ in. wide at the summit, glabrous, plano-convex; ligule large, glabrous, lacerate; blade circular, tomentose on the margins of the many segms., 3–5 ft. diam., cleft on the upper side nearly to the middle, gray-green; segms. margined with numerous fibers 6–12 in. long: seed flattened on the raphal face. Probably S. Calif. and W. Ariz.—Cult. on the Riviera, S. France, but not distinguished in this country.

Var. **robusta,** Parish (*W. robusta*, Wendl. *W. filifera*, Hort., not Wendl. *Neowashingtonia filamentosa*, Sudw.). Fig. 3997. The palm usually cult. in this country as *W. filifera*, whereas the one cult. as *W. robusta* is really *W. gracilis:* margins of petiole armed throughout: trunk stout, enlarged at base, 60–90 ft. tall: petioles stout and erect until old, 3–5 ft. long, the upper surface concave; ligule paper-like, acuminate and torn; lf.-blade 3–5 ft. across, with 60–70 folds, cleft two-thirds to the base, the margins with abundant threads: panicle declined, exceeding the lvs., the infl. dense, but in fr. becoming diffuse or open: fls. with heavy odor: seed excavated on raphal face. Borders of the Colorado Desert in S. Calif., at low altitudes.—The commonly planted Washingtonia in Calif. with filiferous lvs. The portraits in horticultural magazines are mostly not clearly referable.

Var. **microspérma,** Becc. Cult. in the Riviera but yet undiscovered in the wild, differing in smaller stature, and margins of petioles armed only at base: seed flattened on raphal face.

grácilis, Parish (*W. robusta*, Hort., not Wendl.). A slender-trunked palm, to 80 ft. or so, the lvs. nearly or quite destitute of filaments: petioles 2–3 ft. long, rather convex on upper surface, the hard margins armed with short yellow hooked spines for the entire length, the top acuminate where it joins the blade; ligule paper-like, narrow, entire; lf.-blade about 3 ft. diam., with 75–80 folds, cleft little more than one-third toward base: peduncle declined, exceeding the lvs.: fls. nearly sessile: seed broad-ovate, about ¼in. long, somewhat rugose or wrinkled on the raphal face. Probably native in northern Low. Calif.—From the *W. filifera* group this tree is distinguished by its slender trunk, smaller and less deeply divided shorter-stalked lvs. which bear no filaments or threads except now and then one in the sinuses of some of the folds.

3997. Old tree of Washingtonia filifera var. robusta.

Sonóræ, Wats. (*Neowashingtonia Sonoræ*, Rose). Top of petiole obtuse where it joins the blade, the latter abundantly supplied with filaments: st. 25 ft. high, 1 ft. diam.: lvs. 3–4 ft. diam., somewhat glaucous, very filiferous; petioles 3 ft. long, very slender, 2 in. wide at base, ¾in. at apex, floccose-hairy along the margins and with stout curved spines: fr. ¼in. long, edible. Guyamas and Low. Calif., Mex.—Yet imperfectly known in cult. L. H. B.†

WATER ALOE: *Stratiotes aloides.* **W. Arum:** A name sometimes applied to *Calla palustris.* **W. Beech:** *Carpinus caroliniana.* **W. Caltrops,** or **Water Chestnut:** *Trapa natans.* **W. Chinkapin,** or **Chinquapin:** *Nelumbo lutea.* **W.-Cress:** *Cress* and *Rorippa Nasturtium.* **W. Hyacinth:** *Eichhornia.* **W.-Leaf:** *Hydrophyllum.* **W. Lemon:** *Passiflora laurifolia.* **W.-Lettuce:** *Pistia Stratiotes.* **W.-Lily:** *Nymphæa.* **W. Milfoil:** *Myriophyllum.* **W. Oak:** *Quercus nigra,* commonly known as *Q. aquatica.* **W. Oat:** *Zizania palus-*

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tris. **W.-Plants'n:** *Alisma Plantago-aquatica.* **W. Reed:** *Arundo.* **W. Pest:** *Elodea canadensis.* **W.-Shield:** *Brasenia Schreberi.* **W. Soldier:** *Stratiotes aloides.* **W.-Thyme:** *Elodea canadensis.* **W.-Weed:** *Elodea canadensis.*

WATER-GARDENING: *Planting,* Vol. V, p. 2668.

WATERING. The watering of plants usually exhibits the skill, or the lack of it, of the gardener. It is a practice that cannot be well explained in print, although a few general statements may be made.

An abundant and convenient supply of pure fresh water should always be a first consideration in locating a garden or greenhouse. Having this, the next matter is knowing how to use it, for here, good gardeners say, lies nine-tenths of the elements of success. Certain it is, especially in the indoor cultivation of plants, that more depends on knowing when to give or withhold water than on any other single matter. The art of watering is unteachable; it requires experience, judgment, skill. Some knowledge of the commoner facts of vegetable physiology, physics, and soil physics will be helpful, but even then experience will be necessary.

In American gardens watering is usually performed with a hose from a stored water-supply. Two common types of watering-cans are shown in Fig. 3998.

A fairly safe guide to watering is: never water plants until the soil has become dry, though not "powder-dry," and then give them a thorough soaking. Plants dislike a continuously wet soil. In the care of plants in earthenware vessels, a useful test is to thump the jar. If it rings the soil is dry; if the sound produced is dull the soil is sufficiently moist. Such rules, however, are only for the novice. They presuppose activity of growth, and take into account only one consideration aside from this, and that is the condition of the soil as regards moisture. The experienced gardener reads his practice in his plants and the conditions under which they are being kept. The following suggestions are based on the most important considerations.

Actively growing plants may be watered very freely, as a rule, whereas in a dormant or semi-dormant state the same plants will require only occasional waterings. Soft-stemmed or rapid-growing plants ("soft-wood" and "herb-like" plants), and those with large leaves, need, as a rule, an abundance of water when growing actively. Hard-wood or slower-growing plants, with smaller leaves, must be watered with greater care. Soft-wooded plants, with some exceptions, may at times even flag somewhat for want of water, and recover without permanent injury when a fresh supply is given. Hard-wooded plants, as camellias, azaleas, and heaths, on the other hand, suffer permanent injury from becoming too dry. It is safest to allow no plant in active growth to flag.

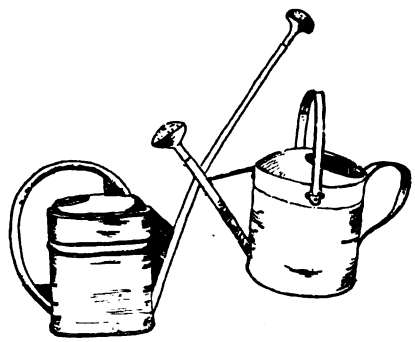
The amount of foliage affects the plant's capacity for using water. Plants which have been cut back, or which from disease, insects, or other causes, have lost most of their foliage, must be kept drier until they have regained their foliage. Unhealthy plants are benefited, as a rule, by being kept rather dry until they begin to show signs of renewed vigor.

Small cuttings, or any plants freshly potted or newly transplanted, are not in condition to use much water until the root-hairs have attached themselves to the soil-particles and growth has begun. A thorough watering at the time of potting or repotting the plants, especially if they are subsequently shaded for a few days, is usually sufficient until they have become established.

The character and bulk of soil should be kept in mind. Porous and warm soils dry out much sooner, while the heavier clay soils are in danger of becoming water-logged and sour unless watered with care. When there is a large mass of soil in proportion to root-development, as in the case of greenhouse beds newly set with young plants, care must be used in watering until the soil is occupied with roots.

Serious trouble often begins in the greenhouse from a heavy watering at the beginning of a period of dark muggy weather. Not only does such watering do damage to the soil and roots, but the excessive humidity of the air about the plants and its weakening effect on their tissues invite the attacks of various mildews, fungi, and insect pests.

The time of day is important. In the greenhouse in winter free ventilation is usually impossible. At night there is a tendency toward a damp atmosphere. Careful florists, therefore, water in the early part of the day at this season, so that the house will have become somewhat dried out by nightfall. It is seldom advisable to let plants under glass go into the night with wet foliage. It gives the fungi a chance. Especially hazardous is it to water cutting benches or boxes of young seedlings late in the day in the winter season. The various damping-off fungi find under such treatment the condition suitable for their development. Excessive humidity on the interior of a closed plant-house is most likely to occur in moderate weather. During severe weather the condensation upon the glass is large and renders the air of



3998. Watering-cans, capacity 3 to 4 gallons. Used chiefly for sprinkling seed-beds or newly potted small seedlings and cuttings; for use on older plants the "rose" is commonly removed. The can on the left, flattened on the sides, is generally preferable. It can be carried in greenhouse walks and in narrow rows. The long spout enables the operator to apply the water directly to the roots; and the greater force of the discharging water makes a better spray from the "rose."

the house drier. During summer, when there is free ventilation, the watering may advantageously be done late in the day. Midday watering at seasons when the sunshine is very bright is often followed by scalding of the foliage unless the plants are well shaded. Ferns, Rex begonias, Chinese primroses and richardias are among plants easily injured in this way.

Consider the temperature at which the plants are kept, the position of the heating-pipes, the amount of light, and the freedom of ventilation permissible in watering plants in glasshouses. It is better, as a rule, to have the watering conform to these conditions; but frequently the practice must be reversed.

The temperature of the water exerts a marked effect on the growth, flowering, and fruiting of plants. It is now held that, in general, the water should be of a temperature close to that of the air in the house where the plants are growing, or about 10° F. below.

Watering may be indirect. Shading the glass of greenhouses in summer with some suitable material is much practised by florists for the purpose of sheltering plants from too great intensity of light, and for the purpose of reducing evaporation and transpiration. Certain kinds of plants, as palms, and some kinds of ferns, require this; also newly potted plants. Syringing of walks, by reducing the temperature and increasing the humidity of the air, also tends to reduce transpiration and save watering. Watchfulness and attention to ventilation are necessary, however, to avoid exces-

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sive humidity, which tends toward a soft watery growth and extreme sensitiveness and susceptibility to disease.

Vessels to contain plants should always be provided with openings at the bottom for perfect drainage. This, in a measure, is a safeguard against overwatering. Investigation has shown that a soil which is kept continuously wet through bad drainage or otherwise is rapidly impoverished through loss of nitrogen. A fermentation is also set up in the roots, which, through the formation of various deleterious products, results in their destruction.

While a constantly wet soil is always very objectionable, thoroughness in watering as often as the plants need water is of the greatest importance. When enough water has been supplied there will be more or less dripping from the bottom of the pot. It is a good plan to leave a space of 1½ to 2 inches or more at the top of the pot, according to its size, for the reception of water. This space should be so large that when filled the supply of water in soaking downward will penetrate to the bottom of the vessel.

Plunging the pots or tubs is a means of controlling the water-supply. The late William Scott gives the following advice on this practice: While it is true that most of the water given to the plant passes through the soil and escapes from the hole in the bottom of the pot, yet much that is left in the soil—which is considerable if the soil is saturated as it should be—is evaporated from the porous sides of the earthenware pots. In warm sunny weather, plants in small pots, standing on a bench, dry out very quickly. This can be avoided by plunging the pots in some material, as coal-ashes, tan-bark, or, better than all, spent hops. When plunged to the rims, only half of the surface-watering is needed, and the advantage of less watering is shown by a marked improvement in the health and vigor of the plants. Such a benefit is this plunging that plants which would otherwise need a shift into a size larger pot can be carried along another month in perfect health. This applies more particularly to quick-growing soft-wooded plants, geraniums more especially, for these are quickly exhausted by too frequent waterings.

In watering beds in the open ground and lawns, the chief consideration is thoroughness. Superficial waterings induce the formation of roots near the surface. Neglect and subsequent drought then prove more disastrous than ever. The evening is the best time for surface sprinkling. Watered in the heat of the day, grass and various other plants are likely to have the foliage injured. Ordinarily it is better to avoid watering beds of plants in the open ground if possible or delay it until really necessary, and then water thoroughly. Other references to watering may be found in the article "Greenhouse Management," beginning on page 1408, Vol. III; see also "Sub-irrigation in the Greenhouse," page 1684.

ERNEST WALKER.

WATERMELON: *Melon*, Vol. IV, page 2031.

WATSÒNIA (named for Sir Wm. Watson, M.D., 1715–1787, electrician and professor of botany at Chelsea). *Iridàceæ*. Tunicate bulbous herbs, much like gladiolus, used in the garden for summer bloom.

Stems usually tall: lvs. long, sword-shaped: spikes long, simple or slightly branched; spathes lanceolate oblong or narrow, usually numerous: fls. 1 to a spathe, sessile; perianth-tube curved, broadened above, lobes subequal, ovate, oblong or lanceolate; stamens affixed within the throat; ovary 3-celled, cells many-ovuled: caps. globose, ovoid or short-oblong, loculicidally 3-valved.—About 33 species, S. Afr. The main differences between Watsonia and Gladiolus, from the horticultural as well as botanical points of view, are the longer tube and regular fl. of Watsonia, 3 of the 6 perianth-segms. in Gladiolus being usually different in size, shape, and direction of spread. An important botanical difference is that the style-branches of Watsonia are simple, while those of Gladiolus are bifid.

Watsonias bloom from July to September and have scarlet, rose, or white six-lobed flowers, with usually a long slender tube which is bent near the base. They are very much like gladioli, having the same kind of a corm, the same sword-shaped rigid leaves, the same kind of a spike and the same season of bloom. It is, therefore, a great mistake to suppose that they are suited only to greenhouse cultivation. Great interest has been aroused in watsonias by the introduction of the white watsonia, known to the trade as *W. Ardernei*. The plant might be roughly described as a white gladiolus. It grows 3 to 4 feet high, strong specimens being branched, and bears a dozen or more flowers, each 2½ to 3 inches long and about 3 inches across. The purity of its color and its value for cutting make it of exceptional interest to florists. There are other white-flowered forms of watsonia, but none of them seems to be in the American trade. Pure white is the exception in the iris family, while it is a common, if not dominant, "color" in the lily and amaryllis families. The white watsonia has acquired so many names that a short historical sketch of the plant is desirable. All the stock in the trade at present is supposed to be descended from plants cultivated by H. W. Arderne, of Cape Town. The original bulb was found 80 miles away in a peat-bog amongst thousands of the common pink-flowered kind. In October, 1892, Arderne had 400 spikes in bloom and in March, 1893, some of his plants were pictured in "The Garden" under the name of *Watsonia alba*. However, a pure white-flowered form had been previously found near Port Elizabeth and a bulb sent to J. O'Brien, of Harrow, flowered in England in 1889 and was then fully described as *W. iridifolia* var. *O'Brienii*, the name adopted in this work. In the recent discussions of the plant, the fact has been overlooked that T. S. Ware, of Tottenham, cultivated a white variety in 1880, it being figured in "The Garden" for that year as *Watsonia alba*. A nearly white form was cultivated in England as early as 1801, but the tube was pinkish outside and there was a rosy spot at the base of each perianth-segment. William Watson, of Kew, was the first to emphasize the close horticultural parallel between Watsonia and Gladiolus and to urge the whole group on the attention of the plant-breeder. This suggestion, coming from the man who may be said to have created the modern Cape primrose or streptocarpus, should result in another fine race of hybrids before many years. However, the Watsonia "bulb" is not so easily and safely stored as that of Gladiolus.

A. *Upper part of tube cylindrical or narrowly funnel-shaped.*

B. *Length of perianth-segms.* ⅛–½*in.*

aletroides, Ker-Gawl. Bright scarlet or pale pink-fld. species, 1–2 ft. high, remarkable for the short perianth-segms.: st. simple or branched: spikes 6–12-fld. B.M. 533 (rosy scarlet, splashed with cardinal, the inner segms. white at the tip).

BB. *Length of perianth-segms.* ¾–*1 in.*

C. *Sts. tall, 3–4 ft., often branched.*

D. *Spikes lax, 12–20-fld.*

E. *Fls. scarlet.*

angùsta, Ker-Gawl. (*W. iridifòlia* var. *fúlgens*, Ker-Gawl.). Scarlet-fld. species distinguished from *W. Meriana* by the color of the fls. and by the shape of the perianth-segms. In *W. angusta* the segms. are decidedly acuminate, while those of *W. Meriana* are more nearly oblong and come to a point suddenly; also the style of *W. angusta* reaches to the tip of the perianth-segms., while in *W. Meriana* it does not. B.M. 600. Gn. 17:390 (as *W. Meriana* var. *coccinea*); 44:164. Gn.W. 21:683.

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EE. *Fls. rose-red or white.*

F. *Lvs. ½–¾in. wide: spikes about 12-fld.*

Meriàna, Mill. This seems to be the dominant species of the genus and hence the most variable and the one most interesting to the plant-breeder. In its widest sense it includes *W. iridifolia,* but for horticultural purposes it will be convenient to consider the latter a distinct species. *W. Meriana* is best restricted to the commonest type at the Cape, which is a rose-fld. species 3–4 ft. high, the st. usually branched, lvs. ½–¾in. wide, and the spikes 12–20-fld. This is the plant figured in B.M. 418 as *Antholyza Meriana.* Gn. 17:390 is more typical in color. The white-fld. form, which is rarer in nature, is treated under *W. iridifolia.* Baker says that there are scarlet-fld. forms of this species, but he gives them no name, and it is probable that all such should be referred to *W. angusta.*

FF. *Lvs. wider: spikes denser, 20-fld. or more.*

iridifòlia, Ker-Gawl. (*W. Meriàna* var. *iridifòlia,* Baker). This is treated by Baker as a variety of *W. Meriana* characterized by broader lvs. than the type: fls. closer and more numerous, white or pinkish. For horticultural purposes it will be convenient to treat it as a distinct species and restrict the name to the pink or rose-colored type.

Var. **O'Brìenii,** N. E. Br. (*W. álba,* Hort. *W. O'Brìenii,* Mast. *W. iridifòlia* var. *álba,* Wm. Robinson. *W. Árdernei,* Hort. *W. Árdernei* var. *álba,* Hort. *W. Meriàna* var. *álba,* Hort. *W. Meriàna* var. *Árdernei,* Hort.). WHITE WATSONIA. A variety with pure white fls., discussed on page 3509. Gn. 17:390; 43, p. 229; 51, p. 284; 61, p. 89; 72, p. 17. J.H. III. 29: 219. G.C. III. 11:305; 19:143; 52:129. A.G. 20:573. G. 26:235; 37:285. R.B. 27, p. 33. G.M. 49:477. G.L. 27:180. R.H. 1910, pp. 504, 505.

DD. *Spikes dense, 30–50-fld.*

densiflòra, Baker. This very distinct and handsome rose-colored species more nearly resembles a gladiolus than any other by reason of the density and regularity of its pyramidal infl.: sts. unbranched, 2–3 ft. high: spikes a foot long: fls. bright rosy red. B.M. 6400.—There is a choice variety with pure white fls. Var. **álba,** Hort., was intro. as early as 1891.

CC. *Sts. shorter, mostly 1–2 ft., unbranched.*

D. *Tube 1½–2 in. long.*

coccínea, Herb. This showy scarlet-fld. species differs from *W. Meriana* in its st. being shorter and unbranched, the spikes fewer-fld., and the styles a trifle longer: st. 1 ft. high: spikes 4–6-fld.: corolla-tube elongated, longer than the limb, the lobes spreading, oblong, acutish. B.M. 1194 (*W. Meriana* variety). J.H. III. 53:61.

DD. *Tube 1½–2 in. long.*

hùmilis, Mill. This species has rose-red fls. apparently the same size and color as *W. densiflora* but only 4–6 in a spike and the st. only a foot or so high: corolla-lobes oblong-lanceolate, acutish. B.M. 631.—A variegated form figured in B.M. 1193 as *W.ròseo-álba* has a spike of 8 flesh-colored fls. with broad bands and splashes of scarlet.

AA. *Upper part of tube short and broadly funnel-shaped.*

ròsea, Ker. Robust rose-colored species, growing 4–6 ft. high and the fls., though fewer than those of *W. densiflora,* are perhaps capable of greater size: spikes about 15-fld.: lvs. lorate-lanceolate: corolla-limb nodding, subcampanulate. B.M. 1072. G. 26:445. Gn. 77, p. 484. J.H. III. 44:162.

WILHELM MILLER.
F. TRACY HUBBARD.†

WATTLE: *Acacia.*

WAXBERRY: *Symphoricarpos.* **W. Myrtle:** *Myrica cerifera.* **W.-Palm:** *Ceroxylon* and *Diplothemium.* **W.-Plant:** *Hoya carnosa.* **W.-work:** *Celastrus scandens.*

WEDÈLIA (Georg Wolfgang Wedel, professor at Jena, Germany, 1645–1721). *Compósitæ.* Scabrous-pubescent or hirsute, annual or perennial herbs or subshrubs, suitable for growing in the greenhouse: lvs. opposite, usually dentate, rarely 3-cleft or entire: head heterogamous; ray-fls. male, disk-fls. fertile or the innermost sterile; involucre ovoid, campanulate or somewhat hemispherical, bracts in 2 rows; corolla yellow, male ligulate, spreading, apex entire or 2–3-toothed, female regular, tubular, 5-toothed or shortly 5-cleft: achenes glabrous or pilose, smooth or tuberculate, cuneate-oblong or obovate.—About 70 species, natives of the warmer regions of the world.

oblónga, Hutchins. Glandular-hairy herb, up to nearly 3 ft. high: lvs. oblong or oblong-lanceolate, acute, 3–3½ x ¾–1 in.: peduncles 1½–2 in. long: fl.-heads lemon-yellow, 1½–2 in. diam.; outer bracts leaf-like, inner somewhat scarious; ray-florets about 12, 3-toothed. British E. Afr.

To this genus, Pascalia is referred by recent authors. *P. glàuca,* Orteg., is from Chile, probably not in cult. The plant cult. under this name in England, and once offered in this country, is probably the plant shown in F.M. 8:125, which is thought to be a Helianthus. It is not hardy and there seems to be little reason for cultivating it here where there are so many hardy sunflowers. *P. glauca* is an herbaceous perennial, with opposite linear-lanceolate lvs., the upper ones entire and lower ones irregularly dentate: heads terminal and solitary, yellow-rayed.

WEEDS. A weed is a plant that is not wanted. There are, therefore, no species of weeds, for a plant that is a weed in one place may not be in another. There are, of course, species that are habitual weeds; but in their wild state, where they do not intrude on cultivated areas, they can scarcely be called weeds. The common pigweed and the purslane are sometimes vegetables, in which case potato plants would be weeds if they grew among them.

It would have been a sorry thing for agriculture if there had been no weeds. They have made us stir the soil, and stirring the soil is the foundation of good farming. Even after we have learned that crops are benefited by the stirring of the land, we are likely to forget the lesson or to be neglectful of it unless the weeds constantly remind us of it. Necessity is always the best schoolmaster; and of these necessities, weeds are amongst the chief.

The one way to destroy weeds is to practise good farming. Judicious tillage should always keep weeds down in cultivated lands. In idle lands weeds are likely to be a serious nuisance. In sod lands they are also likely to take the place of grass when for any reason the grass begins to fail. The remedy for weeds in grass lands, therefore, is to secure more grass. In order to do so, it may be necessary to plow the land and reseed. In some cases, however, it is only necessary to give the land a light surface tillage, to add clean and quickly available fertilizers, and to sow more grass seed. This is the fundamental remedy for weeds on lawns. If such weeds are perennial, as dandelion and plantain, it is advisable to pull them out; but in order to keep them out, a stiffer sod should be secured. The annual weeds that come in the lawn the first year are usually destroyed by frequent use of the lawn-mower.

Foul lands may usually be cleared of weeds by a short and sharp system of rotation of crops, combined with good tillage in some of the crops of the series. When the land for any reason is fallow—as when it is waiting for a crop—surface tillage with harrows or cultivators will serve to keep down the weeds and to make the land clean for the coming crop. Often lands that are perfectly clean in spring and early summer become foul in the fall after the crops are removed. Cleaning the land late in the season, therefore, may be one of the most efficient means of ridding the place of weeds. Coarse and rough stable manure, which is not well rotted, may also be a conveyer of weed seed. The seeds of weeds are sometimes carried in the seed with

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which the land is sown, particularly in grass and grain seeds.

It does not follow that weeds are always an evil, even when they are abundant. In autumn a good covering of weeds may serve as an efficient cover-crop for the orchard. They are likely to entail some extra care the next year in order to prevent them from gaining a mastery, but this extra care benefits the orchard at the same time. It is, of course, far better to sow the cover-crop oneself, for then the orchardist secures what he wants and of the proper quantity and at the right season: but a winter cover of weeds is usually better than bare earth.

From the above remarks it will be seen that weeds are scarcely to be regarded as fundamental difficulties in farming, but rather as incidents. In the most intensive and careful farming the weeds bother the least. There should be a careful oversight of all waste areas, as roadsides and vacant lots. The greatest difficulty arises on commons and waste land, not on farms.

Weeds are often troublesome in walks, particularly in those made of gravel. If the walk were excavated 2 feet deep and filled with stones, rubble, or coal-ashes, weeds cannot secure a foothold. It is particularly important that gutters be not laid directly on the soil, else they become weedy. There are various preparations that can be applied to walks to kill the weeds, although, of course, they also kill the grass edgings if carelessly applied. Strong brine, applied hot, is one of the best (one pound of salt to one gallon of water). There are also preparations of arsenic, vitriol, lime, and sulfur, known as herbicides. For identification of weeds and means of control, see Georgia's "Manual of Weeds," New York, 1914. L. H. B.

WEIGÈLA, WEIGÈLIA: *Diervilla.*

WELDENIA (for Ludwig von Welden, an Austrian army officer, wrote on natural history; 1780–1853). *Commelinàceæ.* Tuberous-rooted herb, suitable for the greenhouse: lvs. numerous, grouped at the top of the st., forming a sort of involucre about the fls.: cymes very densely fasciculate, sessile among the lvs.; calyx sessile, 1½ in. or less long, membranaceous, long and laxly tubular, often spathe-like, split, apex shortly 3-cleft; corolla-tube slender, much longer than the calyx, lobes broad, spreading, subequal; stamens 6; ovary ovoid.—One species. **W. cándida,** Schult. f. St. short, simple: lvs. 6–8, strap-shaped, 2–6 in. long, with folding bases, pale green: fls. snow-white, 1 in. diam., solitary on erect scapes. Mex. and Guatemala. B.M. 7405.

WÉLFIA (named in honor of the English royal family). *Palmàceæ.* Unarmed palm, with a thick tall reed-like caudex, suitable for the warmhouse: lvs. terminal, pinnatisect; segms. coriaceous, strongly narrowed at base, apex entire or acuminately cut, many-nerved, plicate: spadices stout, pendulous; spathes 2, deciduous: fls. in deep hexagonal depressions, monœcious; male asymmetrical, sepals lanceolate, acute, petals broadly ovate, obtuse, stamens numerous, ovary rudimentary; female about equaling the male, compressed, sepals free, cymbiform-lanceolate, acuminate, petals much larger, 2 lateral cymbiform wing-keeled, dorsal narrower, flat, staminodes in a conical cup, ovary conical-subulate, 3-celled: fr. oblong, compressed, about 2 in. long, dark violet.—Two species, Cent. Amer. and Colombia. *W. règia,* H. Wendl. Up to 60 ft. high: lvs. when young divided almost to the base into a pair of oblong acuminate lobes, having a bronzy tint, at length becoming pinnatisect, borne on slender petioles; adult lvs. about 20 ft. long, pinnæ numerous, narrow, unequal, decurrent on the angular rachis, whitish beneath. G.C. 1870:764. F.M. 1873:60. I.H. 18:62.

WELLINGTÒNIA: *Sequoia.*

WELWÍTSCHIA (Dr. Friedrich Welwitsch, 1806–1872, botanical traveler, who brought this remarkable plant to notice). *Gnetàceæ.* One of the most singular of plants, sometimes seen in the dried state in museums and rarely grown in botanic gardens.

The plant consists essentially of 2 persistent woody lvs. lying near or on the ground, the ends becoming much frayed (at one time supposed to be persistent cotyledons), and from the center or crown the cone-like fructification arises. It may be described as follows: A low woody plant, sometimes grown as an oddity: st. or trunk thick, cone- or top-shaped, usually somewhat raised above ground, more or less 2-lobed, said to be sometimes 14 ft. in circum.: lvs. 2, lasting the life of the plant, linear at first, later splitting into many sections: infl. axillary, paniculate, dichotomously branched, the branches ending in 4-angled ament-like spikes which are colored: fls. dioœcious; male fls. with 4 perianth-segms. in the shape of a cross, stamens 6, joined at the base, seed sterile; perianth of female fls. tubular, inclosing completely the fertile seed.—One species, arid places Trop. and S. W. Afr.

The oldest actual name for this strange plant is Tumboa, which was mentioned incidentally in the Gardeners' Chronicle, 1861, page 75, in a running account of a meeting of the Linnean Society; and the name *T. Bainesii,* Hook. f., was similarly mentioned on page 1008 in an account of a meeting of the Royal Horticultural Society. In the same journal in 1862 the name *T. strobilifera* was also mentioned. Neither the genus nor the species was botanically defined. In Gardeners' Chronicle for 1862, the name Welwitschia was proposed, and under this name the characters were carefully drawn and the plant regularly described in Trans. Linn. Soc., 1863, and in the same year in B.M. 5368, 5369. Under this name the plant has passed; but in Engler & Prantl, Pflanzenfamilien Nachtr. (1897), attention is called to the older Tumboa as the proper name, and this name is taken up in Cat. Welwitsch Afr., pl. II, pt. 1 (1899). All the preceding literature is under Welwitschia and all the horticultural references; and inasmuch as the aim in nomenclature is, or should be, stability rather than priority, the principle of long-accepted usage should be invoked in this case and the name Welwitschia retained, particularly as the name Tumboa was not formally founded and as the revival of it contributes nothing to clearness or definition. (It is retained by the Brussels Congress.)

In respect to the cultivation of Welwitschia, W. Watson, Curator of the Royal Botanic Gardens, Kew, England, writes in 1916: "We have a plant here which was raised from a seed in 1880. It lives, but growth is very slow, so slow that a full-sized plant, such as we have in our Museum, might at this rate be reckoned a thousand years old. We grow it in a tropical house devoted to succulents, where it gets all the sunlight, the usual amount of water, except for about three months in winter, when it gets very little, and it is potted in sandy loam. There may be a set of conditions that would suit the plant better, though experiments with other plants raised here since did not reveal anything better."

mirábilis, Hook. f. Lvs. 6 ft. or more long, the split ends reclining on the ground, flat and long-narrow, attached at the base to the crown of the wrinkled brown and hard trunk: plant said to persist a century. G.C. III. 47:56. J.H. III. 46:38. G.W. 9, pp. 294–5.

L. H. B.

WESTRÍNGIA (J. P. Westring, Swedish physician and author; died 1833). *Labiàtæ.* Shrubs, suitable for greenhouse cult., although apparently not now in common cult.: lvs. in whorls of 3, 4, or rarely more, entire·

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fls. axillary or rarely in terminal leafy heads; calyx campanulate, 5-toothed; corolla-tube short and dilated at the throat, limb 2-lipped, upper lip flat, broadly 2-lobed, lower spreading, 3-lobed; stamens, 2 upper perfect, 2 lower sterile: nutlets reticulate-rugose.—About 12 species, natives of extra-Trop. Austral.

rosmarinifòrmis, Smith. VICTORIAN ROSEMARY. A bushy shrub with the branches and under side of lvs. silvery white with appressed hairs: lvs. in whorls of 4, oblong-lanceolate to linear, ½–1 in. long: fls. white, axillary, almost sessile; calyx 3 lines long; corolla not twice as long as the calyx. Sandy hills, near the seacoast, Austral.—Offered in S. Calif.

F. TRACY HUBBARD.†

WHEAT: *Triticum.* **W., India:** *Fagopyrum tataricum.*

WHÍPPLEA (in honor of Lieut. A. W. Whipple, commander of the surveying expedition to the Pacific Ocean in 1853–1854). *Saxifragàceæ.* Two low shrubs in W. N. Amer. with small opposite nearly sessile lvs., 3-nerved and entire or sparingly dentate, appressed-hairy on both sides, and with small white fls. in terminal cymes: fls. 5- or rarely 6-merous; receptacle turbinate, adnate to the base of the ovary; sepals lanceolate;

3999. Wigandia caracasana. (×¾)

petals small, oblong-spatulate; stamens 10, rarely 12, with dilated lanceolate filaments and subglobose anthers; ovary half-superior or nearly superior, with 3–6 short styles: fr. a caps. separating into 3–6 1-seeded carpels. They are not hardy N. and rarely cult. in botanical collections only, as they possess no particular ornamental qualities. They are plants of dry regions and demand a well-drained soil; the best place for them is in a rockery. Prop. is by greenwood cuttings under glass and by seeds treated like those of deutzia or hydrangea.

modésta, Torr. Sarmentose; the long shoots with numerous short upright flowering branchlets, pubescent: lvs. broadly ovate to elliptic, acutish, with a few shallow teeth or nearly entire, appressed-hairy on both sides, ½–1 in. long: fls. white, about ⅕in. across, in slender-stalked dense cymes ⅓–½in. long. May. Ore., Calif.

utahénsis, Wats. (*Féndlera utahénsis,* Greene. *Fendlerélla utahénsis,* Heller). Much-branched, upright shrub, to 2 ft., pubescent: lvs. elliptic-ovate to linear-oblong, acute, entire, ⅛–½in. long, appressed-hairy on both sides: fls. white, in terminal small cymes ½–¾in. across. July. Ariz., Colo., Utah.

ALFRED REHDER.

WHITFIÈLDIA (named after Thomas Whitfield, intrepid naturalist who made several explorations into Trop. W. Afr. and brought back many choice plants). *Acanthàceæ.* Glabrous shrubs, rarely used as warm-house ornamentals: lvs. opposite, entire: fls. white or brick-colored, solitary in the axils of opposing bracts, arranged in a terminal raceme; calyx 5-parted, segms. membranaceous, colored, oblong or lanceolate; corolla-tube swollen almost from the base or slender-cylindrical and abruptly inflexed above widening to a campanulate throat, 5-lobed, lobes ovate or oblong-lanceolate; stamens 4, in pairs.—About 17 species, Trop. Afr. The material which has been offered in Amer. as *W. lateritia* is really *Jacobinia carnea* (see Vol. III, p. 1714): the true *W. lateritia,* Hook., is rarely cult. and is a tender evergreen shrub about 3 ft. high: lvs. ovate or oblong-ovate, wavy: fls. red; corolla bell- or funnel-shaped. W. Trop. Afr. B.M. 4155. F.S. 1:36.

WHITLÀVIA: *Phacelia.*

WHORTLEBERRY: *Vaccinium.*

WIDDRINGTÒNIA: *Callitris.*

WIGÁNDIA (named after Johannes Wigand, Pomeranian bishop; wrote on plants; 1523–1587). *Hydrophyllàceæ.* Tall hispid perennial herbs or subshrubs, used for subtropical bedding, or may be grown in the greenhouse.

Leaves alternate, large, rugose, doubly dentate, cymes terminal, large, dichotomous: fls. sessile, 1-sided along the branch; calyx-segms. linear; corolla-tube shortly and broadly campanulate, scaled inside; limb broad, spreading, 5-lobed, lobes imbricate; stamens 5; ovary rather perfectly 2-celled: caps. 2-valved. —About 3 or 4 species, widely dispersed in the mountains of Trop. Amer. Monographed by A. Brand in Engler's Pflanzenreich hft. 59 (IV. 251). The species of Wigandia are very much confused in current reference books, as well as in the trade. The following account is based on André's revision of the genus in R.H. 1861: 371, with an important change in the name of one species. In respect to *W. urens,* André follows the previous revision by Choisy in DC. Prod. 10:184. The combination *Wigandia urens* was first used by Kunth, who applied it to a Mexican plant. Before this, however, another plant of the same family but a native of Peru had been called *Hydrolea urens.* When Choisy came to monograph the whole family he transferred *Hydrolea urens* to the genus Wigandia and called it *Wigandia urens,* Choisy. He therefore had to rename the Mexican plant, and this he called *Wigandia Kunthii.*

Wigandias are chiefly valued as foliage plants for subtropical bedding, because of their very showy character. Their leaves are covered with stinging hairs, similar to nettles. Many large specimens may be seen in California, but the plants are considered to be rather coarse and straggling. They are generally raised from seed every year, the seed being started indoors as early as January. The plants attain a height of 6 to 10 feet in a single season. They are unsatisfactory greenhouse plants, as they do not grow vigorously indoors. The roots may be kept over winter in a frostless place and stock may be secured in spring by cuttings. In general, the plants are not much used in North America.

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caracasàna, HBK. Fig. 3999. Erect robust subshrub, up to 9 ft. high, softly golden or silky-pubescent: lvs. rather long-petioled, ovate, obtuse, base subcordate, 18 x 10 in., coarsely, doubly and irregularly crenate, white-tomentose beneath: infl. golden silky-pubescent, terminal, elongate, strict (a thyrsoid cincinnus): corolla violet, tube white: caps. equaling or a little longer than the calyx. S. Mex. to Venezuela and Colombia. B.M. 4575 (adapted in Fig. 3999). B.R. 1966. F.S. 8:755. Gn. 4, p. 503; 8, p. 198. R.H. 1859, p. 653. J.F. 2:132. Var. **macrophýlla,** Brand (*W. macrophýlla,* Cham. & Schlecht.), is a larger-lvd. form which also grows rather taller than the type and has the infl. white-silky-pubescent. R.H. 1861:371.—It is the Mexican form of the species and the one mostly in cult.

Kúnthii, Choisy (*W. ùrens,* HBK., not Choisy). Very hispid subshrub, not golden pubescent, about 6–15 ft. high: lvs. doubly sharp-serrate, not white-tomentose: infl. not at all thyrsoid, but paniculate, very hispid, rarely pubescent or dirty tomentose: corolla violet, tube white: caps. slightly longer than the calyx, very densely hispid. Mex. to Honduras.

ùrens, Choisy, not HBK. (*W. peruviàna,* W. Mill. *Hydròlea ùrens,* Ruiz & Pav.). Stout erect subshrub up to 12 ft. high, very densely dirty white-hispid: lvs. short-petioled, 8–12 x 6–7 in., broadly ovate, irregularly dentate-serrate, base cordate or truncate, apex obtuse: fls. arranged in a broad terminal raceme (cincinnus); sepals lanceolate-acute, hispid; corolla violet, parted to the middle, lobes elliptical, densely silky outside: caps. oblong, twice shorter than the calyx. Peru. R.H. 1867, p. 470.

W. imperiàlis is listed as a very ornamental plant, but is not treated by Brand.—*W. Viçièri,* Carr., is not treated in Brand's monograph and is apparently a horticultural form, perhaps of W. caracasana. Carrière merely said it was a silvery plant instead of somber and glutinous like W. caracasana. It is frequently listed in the trade and is said to have lilac-blue or wine-colored fls.

F. Tracy Hubbard.†

WIKSTRŒMIA (named after J. E. Wikstrœm, professor of botany at Stockholm, 1789–1856). *Thymelæàceæ.* Shrubs or trees, occasionally grown in the warmhouse or greenhouse: lvs. opposite or rarely alternate: fls. in short terminal or axillary racemes, spikes or heads; perianth tubular, limb spreading, 4-lobed, without scales in the throat; stamens 8; ovary villous, 1-celled: fr. a berry-like drupe.—About 40 species, Trop. Asia, Austral., and the islands of the Pacific.

canéscens, Meissn. (*W. pauciflòra,* Franch. & Sav.). Small shrub, 1–3 ft. high: lvs. 1–3 in. long, thin, alternate and opposite, oblong-lanceolate: perianth 3–4 lines long: fr. silky. Himalayas, Ceylon, China. The Japanese plant is *W. Ganpi,* Maxim. (*W. canescens* var. *Ganpi,* Miq.); from its bark apparently is made the celebrated Japanese copying-paper.

WILCÓXIA (named for Brig.-Gen. Timothy E. Wilcox, U. S. Army). *Cactàceæ.* Usually low weak plants growing from a cluster of dahlia-like roots: sts. slender, with low inconspicuous ribs covered with clusters of delicate spines: ovary and fr. bearing clusters of spines; seeds black.—Three species native of Texas and Mex.

Poselgeri, Brit. & Rose (*Echinocèreus tuberòsus,* Rümpl. *Cèreus tuberòsus,* Posel.). Roots black, several, borne near the surface: sts. 2 ft. or less high, with about 8 ribs, the lower and older part naked, spiny above, the spines almost hiding the ribs; spines appressed, delicate, pubescent, radials 9–12; central one ascending, black-tipped: fls. purple, 2 in. long: seeds pitted or rugose, ⅛in. long.—This species, although often cult., does not do well under glass when grown on its roots, but when grafted on various species of Selenicereus, it does extremely well.

J. N. Rose.

WILD FLOWERS: Their appeal and conservation. In many countries some kind of wild flower holds first place in the love and sentiment of the inhabitants. The rose, the thistle, the shamrock, the iris, the edelweiss and alpine rose, the chrysanthemum, the poppy and the lotus have all contributed their share to the literature and art of the Old World. Thirty of the states have adopted some native American plant for the state flower, including the arbutus, bitter-root, black-eyed Susan, columbine, gentian, goldenrod, laurel, lupine, magnolia, mistletoe, moccasin-flower, Oregon grape, pasque flower, golden poppy, pine cone and tassel, rhododendron, rose, Sego lily, sunflower, syringa, and violet. Of these the goldenrod and violet lead in popularity, with the arbutus, magnolia, and rhododendron next in public favor. Nine states have chosen either cultivated plants of economic value or introduced weeds like the daisy. Thus far, no national flower has been adopted, principally because no wild flower grows or could be grown in all the states and territories, owing to the diversity of climate and flora. An attempt has been made recently to adopt the mountain laurel, but as this is a plant which grows only in the Appalachian regions of the eastern states it has not met with unanimous approval.

That a widespread interest in native plants exists there can be no question. Local and popular floras abound, poems and songs appear frequently, yet the people as a whole are still barbarians when it is a question of real love and protection. Arbutus is still pulled up from the roots and sent through the mails in frail and broken pasteboard boxes, having been nearly or quite exterminated where formerly it was abundant. Orchids and lilies are gathered by the basketful to adorn college commencements and church services. Ropes of laurel and ground-pine are used at balls and Christmas festivities, and the holly which used to be abundant is rapidly becoming scarce and hard to find. All these supplies come from wild sources and few of them would pay to cultivate. Moderation and protection are recommended for all of them. Some few of our wild flowers take kindly to cultivation, and are grown for their beauty: laurel, rhododendron, azalea, dogwood, and magnolias perhaps lead in popularity, but some of the smaller herbaceous plants such as bloodroot, hepatica, columbine, lilies, jack-in-the-pulpit, forget-me-nots, and many of the native ferns may be readily grown if given suitable conditions of soil, moisture, and shade. Most wild flowers prefer an acid soil with plenty of leaf-mold to the ordinary garden soil, and should be planted in some place by themselves where natural conditions can be maintained.

A hopeful sign of advancing appreciation is that the best landscape architects and park superintendents are recommending the planting and preservation of native plants and in many of the national parks and public reservations the native flora is protected from depredation. With the increase of motors has come an interest in good roads and roadside planting, but some of the railroads in Colorado still run "flower excursions" where a lot of vandals are taken to some beautiful spot and come home loaded with wild flowers which they promptly throw away. It is this spirit of selfish and thoughtless destructiveness which should be combated by all true lovers of native plants, and various organizations for their conservation have been formed to try to accomplish it. Arbor Day might fitly be called Conservation Day and used to impress on school children the importance of this work.

The following associations are interested and will supply information to those wishing to coöperate: Conservation Department, General Federation of Women's Clubs; Conservation Society of National Educators; American Association of Forestry; State Associations of Forestry; Garden Clubs of America, Philadelphia; Lincoln Highway Commission; Society for the Protec-

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tion of Native Plants, Boston; Stokes Fund for the Preservation of Native Plants, New York Botanical Garden; American Association of Park Superintendents, Portland, Oregon; Wild Flower Preservation Society of America, Brooklyn Botanic Garden.

List of state and provincial flowers.

Alabama	Goldenrod.
Alaska	Forget-me-not.
Arkansas	Apple blossom.
California	Golden poppy.
Canada	Sugar maple.
Colorado	Blue columbine.
Connecticut	Mountain laurel.
Delaware	Peach.
Florida	Orange blossoms.
Georgia	Cherokee rose.
Idaho	Syringa.
Illinois	Native violet.
Indiana	Carnation (pink).
Iowa	Goldenrod.
Kansas	Sunflower.
Kentucky	Goldenrod.
Louisiana	Magnolia.
Maine	Pine cone and tassel.
Maryland	Black-eyed Susan.
Massachusetts	Arbutus, May-flower.
Minnesota	Moccasin flower.
Mississippi	Magnolia.
Missouri	Goldenrod.
Montana	Bitter-root (Lewisia).
Nebraska	Goldenrod.
New Jersey	Violet.
New York	Rose.
North Carolina	Daisy.
North Dakota	Wild rose.
Nova Scotia	Arbutus.
Ohio	Red carnation.
Oklahoma	Mistletoe.
Oregon	Oregon grape (Mahonia).
Pennsylvania	Laurel.
Rhode Island	Violet.
South Dakota	Pasque flower (Anemone).
Tennessee	Daisy.
Texas	Blue bonnet, lupines.
Utah	Sego lily (Calochortus).
Vermont	Red clover.
Washington	Rhododendron.
West Virginia	Rhododendron.
Wisconsin	Violet.
Wyoming	Gentian.
Hawaii	Lehua (Metrosideros).

ELIZABETH G. BRITTON.

WILD-GARDEN: *Planting*, Vol. V, page 2663.

WILLOW: *Salix.* **W., Virginian:** *Itea virginica.*

WILSONÀRA (from a personal name). *Orchidàceæ.* A hybrid orchid described and figured in G.C. III. 59, pp. 312, 315 (June 10, 1916). "The parents include Cochlioda, Oncidium, and Odontoglossum; *Oncidioda Charlesworthii* (*Oncidium incurvum* × *Cochlioda Noezliana*), and *Odontoglossum illustrissimum* (*Lambeauianum* × *ardentissimum*), and through the parentage of the latter *O. crispum*, *O. Pescatorei*, and *O. Harryanum* enter into its composition. The hybrid approaches closely to *Oncidioda Charlesworthii*, and in a marked degree resembles *Odontioda Hermione* (*C. vulcanica* × *Oda. heatonensis*), many of the factors in the combination being difficult to trace. The erect oncidium-like spike bore ten pretty flowers, with purplish claret-red sepals and petals, the three-lobed lip being of whitish lilac color, with a blotch of claret-red in front of the crest."—Exhibited by Charlesworth & Co. For names of similar construction, see *Adamara*, *Linneara*, *Loviara*, *Vuylstekeara.*

WINDBREAK. In horticultural usage, windbreaks are plantations of trees or other plants designed to check the force of the wind or to deflect it to other directions. Windbreaks are often of the greatest use, and at other times they are detrimental. In regions of very strong prevailing winds, they may be necessary to prevent injury to the plants. This is true along seashores. In the dry interior regions, windbreaks are often useful, also, to check the force of parching winds that would take the moisture from the land. In other cases, they are employed for the purpose of sheltering the homestead, to make it more comfortable for human occupancy: such breaks are usually known as shelter-belts. See *Hedges.*

Whether windbreaks shall be used for orchard plantations depends wholly on circumstances. In regions of very strong prevailing winds, as near large bodies of water or on the plains, such breaks are usually necessary on the windward side of the orchard. However, if the prevailing winds are habitually warmer than the local temperature, the winds should not be stopped or wholly deflected, but they should be allowed to pass through the windbreak with diminished power in order that, while their force may be checked, they may still prevent too low temperature. In regions that are very liable to late spring and early fall frosts, a tight break is usually a disadvantage, since it tends to confine the air—to make it still—and thereby to increase the danger of light frosts. If windbreaks are employed in such cases, it is best to have them somewhat open so that atmospheric drainage may not be checked. In most regions, the greatest value of the windbreak for orchard plantations is to protect from the mechanical injuries that result from high winds and to enable workmen to pursue their labors with greater ease. The lessening of windfall fruit is often sufficient reason for the establishment of a windbreak. Usually very cold and very dry winds should be turned from the orchard; very strong winds should be checked; temperate winds should nearly always be allowed to pass through the orchard,

4000. Windbreaks running across the direction of the prevailing winds.

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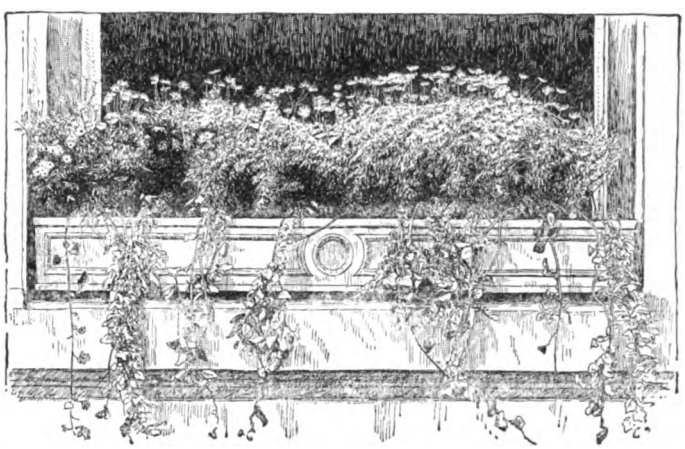
if their velocity is not too great; care must be taken to allow of adequate atmospheric drainage.

Windbreaks for orchards require much land, and crops near them are likely to suffer for lack of food and moisture, and also from shade. In small places, therefore, it may be impossible to establish large breaks. It is well to plant the windbreak at some distance from the first row of orchard trees, if possible. It is usually



4001. A hotel window-box.

best to use native trees for the break, since they are hardy and well adapted to the particular climate. Windbreaks often harbor injurious insects and fungi, and care must be taken that species of trees liable to these difficulties are not used. In the northeastern states, for example, it would be bad practice to plant the wild cherry tree, since it is so much infested with the tent caterpillar. In some cases, very low breaks may be as desirable as high ones. This is true in the open farming lands in the dry regions, since it may be necessary only to check the force of the wind near the surface of the ground. Windbreaks only 2 or 3 feet high, placed at intervals, may have this effect. Fence-rows sometimes act as efficient windbreaks. Near the seacoast, gardeners often plant low hedges for the purpose of protecting the surface of the garden. (See *Plants for the Seaside*, page 2670.) Along the Atlantic coast, the California privet is considerably used. This is *Ligustrum ovalifolium*, a Japanese plant. Farms in the open windy country may be efficiently protected by belts of woodland, or, if the country is wholly cleared, rows of trees may be established at intervals of a quarter or half mile across the direction of the prevailing winds (Fig. 4000).

In middle California, the most common windbreak is a tall thick hedge of Monterey cypress (*Cupressus macrocarpa*), either clipped close or allowed to grow naturally; it withstands heavy winds better than almost any other heavy-foliaged tree and is rapid in its growth. (Fig. 1790.) The Italians and Chinese, who have almost complete control of the truck-gardening industry in and around San Francisco, make extensive use of a Californian tree-mallow, *Lavatera assurgentiflora* (see page 1830), as a break and protection from the drift-sand. In California, various species of Eucalyptus may be used for breaks and wind-stops. The giant reed (*Arundo Donax*) is frequently grown around vineyards, particularly in the immediate vicinity of water. In California the olive, European walnut, fig, and almond are frequently planted for the outside row of an orchard of deciduous fruit-trees, to act as a partial windbreak.

On the plains and prairies, several kinds of poplars and willows, and also the box-elder (*Acer Negundo*), are planted for shelter-belts, because they thrive under most conditions, grow rapidly, and are hardy.

L. H. B.

WINDFLOWER: *Anenome.*

WINDOW-GARDENING. The growing of plants in windows and similar openings, particularly when conducted as a regular and systematic undertaking.

Although not strictly a part of the planting of the property, window- and veranda-boxes give color and tone to the place as well as provide pleasure and satisfaction for the inmates of the residence. For those who live in crowded localities or are unable to care for a garden, these outside boxes offer an opportunity for a display of flowers, not only in the summer months, but, in the case of window-boxes and by the substitution of other kinds of plants, through the winter months as well. The illustrations (Figs. 4001–4003) show good forms of window-boxes. The first two are drawn from illustrations in Gardening, May 15, 1916. See *House Plants*, Vol. III.

These boxes may be purchased and may be highly ornate, having pattern tiling or made of finely finished wood and suspended by fancy brackets; but such boxes are not necessary. A stout pine box of the required length, from 10 to 12 inches wide and at least 6 inches deep, if painted a suitable color serves quite as well as the others, for the side and ends of the box should be soon covered by the drooping vines. Provision for drainage should be made by boring holes in the bottom of the box, these holes being covered with pieces of broken pots, coal-cinders or gravel-stones. This allows for the drainage of water while holding the earth from escaping. The soil for these window-boxes should be rich in plant-food, as the roots will be restricted. The most desirable soil is one that does not pack hard when watered, or contract much when dry, but remains porous and springy.

This soil may be made by mixing two parts of garden loam, one part of leaf-mold or wood earth, and one part of sand. To this mixture should be added well-decayed manure, preferably cow-manure, at the rate of one peck to two bushels of soil.

Many kinds of plants may be used in window- and porch-boxes, but in planting one should choose the subjects most suitable for the particular exposure. If the boxes are to be placed in full sunlight, it will be necessary to choose vigorous-growing sun-loving plants. For

4002. Window-box in a club building.

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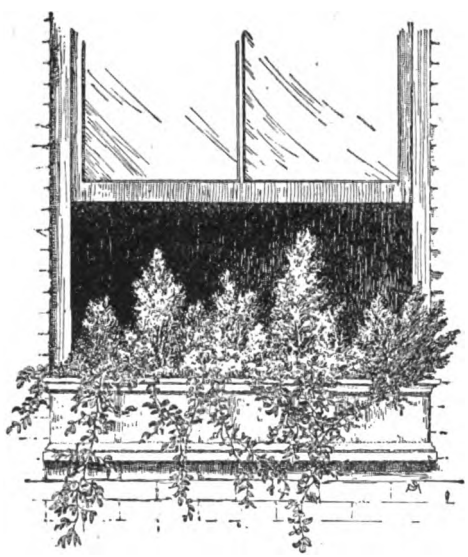
a shady corner or a northern exposure, more delicate plants may be used. For the former, such plants as geranium, coleus, achyranthes (iresine), Paris daisy, double petunias, may be used; or, if a more pretentious display is desired, crotons, colored-leaved dracenas, acalypha, aspidistra, or small palms may be employed. Low-growing plants for the front of the box may consist of the dwarf white-leaved geranium Madame Salleroi, the golden feverfew, lobelia, sweet alyssum, and the white-leaved cineraria. For the drooping vines, nothing excels the variegated-leaved vinca, nasturtiums, tradescantia, and German ivy. If the position is shady, vigorous-growing ferns, such as the nephrolepis, a few of the pteris, and perhaps the hardiest of the adiantums are effective. The narrow-leaved dracena (*Cordyline indivisa*), grevillea, and Rex begonias are all good plants for shady places.

After the plants have filled the box with roots, it will be necessary to work into the soil more plant-food, either a light coating of bone-meal or a thicker layer of well-rotted manure; still better would be a watering about once each week with dilute liquid manure.

One of the objections to veranda-boxes, especially those that are fastened permanently in place, is that in winter they are usually bare of foliage and therefore unsightly. This disadvantage may be overcome and a seasonable appearance given by the use of small conifers, broad-leaved evergreens, small Irish junipers, low-growing junipers, arbor-vitæ, both pyramidal or globular, young trees of spruce, hemlock, or pine. Of broad-leaved evergreens, dwarf box, mahonia, *Evonymus radicans* and pachysandra or *Vinca minor* are all



4003. A window-box of evergreens for winter use.

available. To lighten the somber effect of the solid green, small shrubs bearing bright-colored fruits may be introduced, such as dwarfed plants of barberry, either *Berberis vulgaris* bearing long clusters of dark red fruits or *B. Thunbergii* with bright scarlet berries borne along the gracefully bending branches. Privets, either *Ligustrum vulgare* or *L. Regelianum*, are good for berries, both bearing clusters of blue-black fruits contrasting well with the green of the conifers or the reds of the barberry; these fruits are held through the winter without change in color. Hardy strains of English ivy or drooping plants of *Evonymus radicans* may be used to hide the boxes in winter.

It often happens that one or more plants in a box fail to thrive and the desired effect is lost. An attempt to remove such a plant by digging it out injures the remaining plants, or if the plant is cut out spaces are left. This condition may be obviated by using pot-grown plants, setting the pots containing the plants in the boxes and filling in around the pots with earth or moss; by so doing, any one plant may be removed and another substituted without injury or check to those remaining. By this method it is also possible to effect quick changes in the character of the boxes. The change may be from the winter material to spring-flowering bulbs, from bulbs to pansies, then to summer-blooming annuals, and again to autumn-blooming plants. Combinations may be changed at will, seasonable effects be secured, and the monotony of a planted box be overcome. It is not necessary to grow the plants in large pots, a 4- or 5-inch size being large enough for most of the kinds to be used. In employing this method, however, it is best to have 2 or 3 inches of rich earth in the bottom of the box on which to place the pots; the roots of the plants will escape through the hole in the bottom of the pot and find sufficient food to develop.

This plan of filling the boxes with potted plants will recommend itself when it is not possible to heat the room at all times, as a schoolroom from Friday until Monday; in this case the plants may be carried home over this period.

C. E. HUNN.

WINTER-GARDEN: *Planting*, Vol. V, page 2677.

WINTERGREEN: *Gaultheria* and *Pyrola*. **W., Flowering:** *Polygala paucifolia*.

WINTER PROTECTION: *Planting*, Vol. V, page 2684.

WISTÈRIA (named for Caspar Wistar, 1761–1818, Professor of Anatomy in the University of Pennsylvania, but spelled Wisteria by Nuttall, author of the genus, the spelling Wistaria being a later adaptation). *Leguminòsæ*. WISTERIA. WISTARIA. Attractive large twiners with pea-shaped flowers, planted for covering porches (Fig. 4004), arbors, and buildings; the noblest of the woody vines for temperate regions.

Stout vines, often attaining great age and with woody trunks reaching several inches in diam.: lvs. odd-pinnate, alternate, with 9–13 lfts.: fls. blue, lilac, purplish, or white, in long drooping racemes, in late spring and early summer; calyx bell-shaped, somewhat 2-lipped from the 3 lower teeth being longer than the 2 upper ones; standard large, reflexed, narrowed below and typically with 2 callosities or appendages at base; wings falcate, auricled at base; keel obtuse, scythe-shaped; stamens diadelphous: fr. an elongated 2-valved torulose pod.—The recognized species are 2 in the eastern U. S., and 4 in eastern Asia. Under the American Code, the genus takes the name Kraunhia; the name Bradleia has also been applied. The so-called "evergreen wisteria" is *Millettia megasperma*, described on page 2706, Vol. V. The species of Wisteria are so much confused in domestication that few portraits of them are cited in the following account.

Wisterias will live in rather dry and sandy soil, but they prefer a deep and rich earth. The roots are long and few and go down deep, making few fibers. They resemble licorice root. They are hard to transplant, unless they have been pot-grown for the purpose or frequently transplanted in the nursery row. Unless manured heavily when transplanted, they are very slow in starting into vigorous growth. The most satisfactory method of propagation for the amateur is layering in summer; the following year the layers may be detached. Seeds grow readily, but do not reproduce the horticultural forms; such forms may be grafted on seedlings of *W. frutescens* or other available stock, the union being made at the crown; sometimes root-grafting is employed. Cuttings of roots, an inch or two long, are also frequently used. Cuttings of ripened wood may be struck under glass.

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CXIX. Wisteria sinensis in a striking setting.

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Those who wish to give a young wisteria an extra-good start may sink a bottomless tub in the ground and fill it with good soil. If a wisteria is to be trained to a tree, choose an old tree, if possible, which is past the height of its vigor; but good results are to be expected only when sunlight and opportunity are ample, and these can rarely be secured under a living tree-head.

The Japanese wisteria (*W. floribunda*) is one of the best and commonest of hardy climbers. It has pale green pinnate foliage and bears profusely of dense drooping clusters of purplish pea-shaped flowers. The clusters are about a foot long. This is the commonest and best form. The variations furnish the connoisseur with variety in habit, color, and season of bloom, but they are not as prolific, and doubling adds nothing to the beauty of the flowers. Moreover, the double flowers decay quickly in wet weather.

The wisterias bloom in May and usually give a smaller crop of flowers in August or September. The spring crop is borne on spurs, while the autumn crop is borne on terminal shoots of the season. There are several ideas about training a wisteria. A good way is to let it alone. This produces rugged twisted and picturesque branches and gives a certain oriental effect, but it is not the best method for covering a wall-space solidly or for making the best display of bloom. To cover a wall completely it is necessary to keep the leaders taut and to train outside branches wherever they are needed. If quantity of bloom is the first consideration, the vines should be pruned back every year to spurs, a common method in Japan. The low one-storied Japanese building will have a wisteria so trained that the vine follows the eaves all around the house. The foliage is all above, and the yard-long clusters of purple blossoms depend therefrom in solid unbroken linear masses two or three ranks deep. When trained as a standard, the wisteria requires much care. A fine standard is figured in G.F. 6:256 and Gng. 1:321, where directions may be found. "When young plants of wisteria are cut back to a height of 6 or 8 feet and pruned in for some years, the stem will stiffen until it is able to stand alone, and the top will spread out into a broad head."

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floribunda, 1.	plena, 5.	violaceo-plena, 1.
frutescens, 4.		

KEY TO THE SPECIES.

A. *Standard of the fl. with distinct callosities or appendages at base (Wisteria proper).*
B. *Lfts. 7–9 pairs*.....1. **floribunda**
BB. *Lfts. usually less than 7 pairs.*
C. *Lvs. smooth or nearly so on both surfaces at maturity.*
D. *Racemes long, 6–12 in. or more.*
E. *Fls. large (more than 1 in. across at full expansion): Chinese*.....2. **sinensis**
EE. *Fls. small (less than 1 in. across): American*.....3. **macrostachys**
DD. *Racemes short, 4–5 in. or less: American*.....4. **frutescens**
CC. *Lvs. persistently velvety at maturity* 5. **venusta**
AA. *Standard lacking auricles at base (transition to Millettia)*.....6. **japonica**

1. **floribúnda,** DC. (*Glycine floribúnda*, Willd. *Wistèria brachybòtrys*, Sieb. & Zucc. *Kraùnhia brachybòtrys*, Greene). JAPANESE WISTERIA. Young lvs. densely covered with straight appressed hairs, but foliage soon glabrous; lfts. 7–9 pairs, ovate-elliptic, rather abruptly acuminate, acute, rounded at base: fls. violet or violet-blue, rather small, in moderately long racemes (or sometimes in short racemes, particularly later in the season, whence the name *brachybotrys*); standard oblong-orbicular, subcordate at base and auriculate, with a short stipe-like claw; calyx hairy, the 2 upper teeth very short and broad. Common on

4004. Wisteria covering for a porch.

the margins of woods and along streams in Japan; much cult. there in temple grounds, parks, and gardens; also grown in this country. F.S. 9:880.—From the Chinese wisteria (*W. sinensis*) it is distinguished by more numerous lfts. which are shed earlier in autumn, much smaller, and 2–3-weeks-later fls., and greater hardiness. It runs into several marked forms. Var. **álba** (forma *álba*, Rehd. & Wils. *W. multijuga* var. *álba*, Carr.) has white fls. R.H. 1891, p. 421. Var. **ròsea** (forma *ròsea*, Rehd. & Wils.) has rose-colored or pale pink fls. with wings and tip of keel purple. Var. **variegàta** (forma *variegàta*, Rehd. & Wils. *W. chinénsis* var. *variegàta*, Nichols.) has variegated foliage. Var. **violàceo-plèna** (forma *violàceo-plèna*, Rehd. & Wils. *W. chinénsis* var. *flòre-plèno*, Mill.) is a double-fld. form. R.H. 1887:564. Gn. 17, p. 105. F. 1882:557. Var. **macrobòtrys** (forma *macrobòtrys*, Rehd. & Wils. *W. macrobòtrys*, Sieb. *W. multijuga*, Van Houtte. *W. grandiflòra*, Hort.) has very long racemes, sometimes 2–3 ft.: much prized. F.S. 19:2002. R.H. 1891, p. 176. Under the name *W. multijuga Russelliana*, a slender-racemed form is shown in Gn. W. 21, suppl. Apr. 2, although the lfts. are not more than 5 pairs. This variety is described as having a purple calyx, soft purple standard deepening in color with age on both faces and a creamy white eye-like blotch on the inner face; wings and keel dark blue, the tip of the keel violet; racemes reach 2¾ ft. in length. Named for John Russell, Richmond, Surrey.

2. **sinénsis,** Sweet (*Glycine sinénsis*, Sims. *Wistèria chinénsis*, DC. *W. consequàna*, Loud. *Kraùnhia*

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sinénsis, Makino). CHINESE WISTERIA. Fig. 4005. Lvs. smooth or nearly so at maturity, the petiole swollen at base; lfts. about 5 pairs, ovate-acuminate or ovate-lanceolate, short-stalked, 2–3 in. long, the margins ciliate but entire: racemes pendulous, 6–12 in. long, terminating the branches; calyx villous; corolla large, blue-violet, not fragrant, showy. Low altitudes in China, and much cult. there; apparently little grown in this country and not so hardy as *W. floribunda*. B. M. 2083 (from which Fig. 4005 is adapted). B. R. 650. L.B.C. 8:773. P. M. 7:127. Var. **álba** (forma *álba*, Lindl. Var. *albiflòra*, Lem.) has white fls. I.H. 5:166.

4005. Wisteria sinensis. (× about ⅓)

3. **macróstachys**, Nutt. (*Kraùnhia macróstachys*, Small). Slender vine 20–25 ft. high or long: lfts. usually about 9, ovate to elliptic-lanceolate, about 2 in. long, acuminate or acute, cordate or rounded at base: racemes 6–10 in. long, drooping, loosely fld., the pedicels and calyx glandular-hairy; fls. light blue or purplish, the standard about ½in. across and not prominently auricled; calyx-teeth half or more the length of the tube. Swamps, Ill., southward.—Probably rarely if at all cult.

4. **frutéscens**, Poir. (*Glycine frutéscens*, Linn. *Kraùnhia frutéscens*, Greene. *Bradlèia frutéscens*, Brit. *W. speciòsa*, Nutt.). Tall stout climber, the trunk attaining several inches in diam.: not glandular, smoothish or somewhat downy at maturity: lfts. 4–6–7 pairs, ovate to ovate-lanceolate, acuminate but obtuse, glabrous above: racemes 4–6 in. long, densely fld.; fls. lilac-purple; auricles of the standard rather prominent; calyx-teeth very short. Low grounds, Va. to Fla. and Texas.—Sometimes planted. Var. **álba**, Hort., with white fls., has been listed. Var. **magnífica**, Herincq (*W. magnífica*, Hort.), supposed to belong here, has racemes 50–60-fld. and 6–8 in. long: fls. 1 in. across, lilac with a yellow spot, earlier than in the type. F.S. 11:1151.

5. **venûsta**, Rehd. & Wils. (*W. brachybótrys* var. *álba*, Mill.). SILKY WISTERIA. Tall, reaching 30 ft. or more, the young growth pubescent: lfts. usually 5 pairs (from 4–6 pairs), velvety both sides, oblong-lanceolate or elliptic- to ovate-oblong, short-acuminate, at the base subcordate or rounded or truncate, entire: raceme pendulous, 6 in. or less long including the short peduncle, broad, the rachis densely appressed-villous; fls. very large, white, on nearly horizontal spreading pedicels; standard suborbicular, truncate at apex and auricled at base, clawed; upper calyx-teeth subulate: pod compressed, densely velvetv China, province Chi-li.—More or less planted in Eu. and U. S., but only recently distinguished. Var. **plèna** (forma *plèna*), Rehd. & Wilson. With double white fls., occasionally offered by Japanese dealers; the only double-fld. white wisteria known.

6. **japónica**, Sieb. & Zucc. (*Millèttia japónica*, Gray. *Phaseolòdes japónicum*, Kuntze. *Kraùnhia japónica*, Taub.). Glabrous throughout: lfts. 4–6 pairs, petiolulate, narrow-ovate or ovate-lanceolate, acuminate but obtuse at point, entire, light green: fls. small, white, in long drooping simple racemes to 8 in. long; calyx cylindrical urn-shaped or cup-shaped, pubescent; standard obovate, lacking the callosities at base; ovary and style glabrous: pod linear-oblong, mucronate at apex, woody, not large. Japan, Korea.—Little known in this country, and not hardy in the northern parts. By some authors this species is kept in the genus Millettia, where it was placed by Asa Gray; and under that name it is described in Vol. IV, page 2051.

L. H. B.†

WITCH-HAZEL: *Hamamelis*.

WITHÀNIA. See note under *Salpichroa*.

WITLOOF (Dutch, "white-leaf") is a salad vegetable comprised of the compact blanched leaf-head produced by certain forms of chicory. The large thick roots of chicory produce leaves when forced in absence of light, and these leaves may be further blanched by forcing them through sand or other covering. See *Chicory*.

The vegetable known as barbe-de-capucin, often shortened to barbe, is very similar to witloof, being produced by forcing either wild or improved roots of chicory and having a looser more leafy head. Witloof is usually forced from a special variety, grown for this purpose. As seen in the market in its best form, it is a firm oblong-pointed head about 6 inches long of white crisp undeveloped leaves. (Fig. 4006.) This vegetable is imported into this country in large quantities, being much prized as a delicate salad with a slightly bitter and characteristic flavor. It is frequently known as French endive.

4006. Witloof. (×¼)

There seems to be no reason why witloof can not be produced in this country. The New York Agricultural Experiment Station (Geneva) has recently published the results of tests (J. W. Wellington, Bulletin No. 418), from which the following directions are adapted: The seed (sold by many American seedsmen) from which to grow the forcing roots may be sown any time in May in open ground, in rows 18 inches apart and the plants later thinned to 6 inches apart in the row. Ordinary garden culture only is needed, but the plants should make a steady luxuriant growth, resembling large smooth-leaved dandelions. The roots should be lifted just before the ground is liable to freeze, the leaves trimmed to within 2 inches of the crown, and the roots stored. When needed for forcing in winter, the roots should be placed in beds or boxes where moderate heat can be applied, first cutting them off at the bottom to a uniform length of 8 or 9 inches. For holding the roots any soil or sand will do, since the growth of the heads is from the food stored in the roots and does not depend at all on the soil fertility. The roots may be set quite close together, but not touching, upright in the soil, and

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covered to the crowns. Various materials may be used for holding and bleaching the heads during their growth; 8 inches of clear sand is a good medium. This may be placed on the bedding material as soon as the roots are set. One or more free applications of water should

4007. Woodwardia orientalis.

be made. From 50° to 60° F. is a desirable temperature, the latter probably preferable since growth is slower at the lower temperature. Higher temperature than 60° for any considerable period causes the leaves to shoot up rapidly and decreases the proportion of solid heads. At these temperatures the leaves should begin to show through the 8 inches of sand in about two weeks, when the heads are ready for harvesting.

In the Geneva tests four grades or sizes of roots were used: extra, averaging 2 inches in diameter, large, 1.4 inches, medium, 0.9 inch, and small, 0.6 inch. Of these the large and medium roots gave more than 70 per cent of marketable heads, while the extra roots produced too many divided and loose heads, or heads too large to serve satisfactorily as individual portions at table. The small roots produced many small heads, too slender for market purposes. The heads should be 4 to 6 inches long, and weigh two to three ounces to suit the market best. In Europe they are packed in baskets holding ten kilograms; but a three-pound Climax basket makes a satisfactory package for American markets. L. H. B.

WITSÈNIA (named after Nicholas Witsen, Dutch patron of botany in first half of 18th century). *Iridàceæ*. An ornamental greenhouse shrub with erect ensiform lvs. which are equitant; subsessile fls. with a cylindrical tubed perianth, which has erect connivent lobes and a 3-celled ovary which becomes a shiny leathery caps. Only one species from S. Afr., *W. Maùra*, Thunb., which is not in cult. B.R. 5. P.M. 8: 221. The plant known in horticulture as *W. corymbosa*, Ker, is more correctly named *Nivènia corymbòsa*, Baker. St. tall, woody at base, branched, compressed, acutely angled: lvs. erect, rather rigid, ensiform and equitant, upper ones smaller: fls. 1 (or 2 ?) to a spathe, subsessile; perianth purplish blue, tube elongated, cylindrical, lobes erect, connivent, outer ones rather thick, tomentose outside, inner ones shorter; spathes usually 2 to an axil. S. Afr. G. 32:739. Gn. 72, p. 375.

WÍTTIA (named for N. Witt, of Manaos, Brazil). *Cactàceæ*. Epiphytic spineless flat-stemmed plants: fls. rather small, not fugacious, with a very definite tube; lobes much shorter than the tube. In some respects similar to Rhipsalis, but with very different fls.: perhaps closest to Disocactus.—Three species.

panaménsis, Brit. & Rose. This species has recently been grown in Washington and the New York Botanical Garden, blooming freely every spring. St. much flattened, erect: fls. purple, 1 in. or more long. Native of Panama. J. N. Rose.

WITTMÁCKIA (named for L. Wittmack, professor at Berlin). *Bromeliàceæ*. Tall herbs: lvs. with relatively small thorns, never banded: infl. arising from the lf.-rosette, with membranous sheaths, often nodding or hanging, compound paniculed with long many-fld. racemose branches: calyx free or slightly adnate, the right side strongly winged; petals free, linear, acuminate, without scales: fr. a dry berry. About 5 species, Cent. and S. Amer. This genus has sometimes been referred to Æchmea; see *Billbergia* for cult. *W. lingulàta*, Mez. Lvs. about 10 in a rosette, firm, strap-shaped, rounded, shortly cuspidate, about 2 ft. long, 2½ in. wide, spines short, broad-based, about 3 lines apart: scape floccose when young; sheaths lanceolate; panicle pinnately branched: fls. numerous, sessile; sepals white, ovate, bearing an awn nearly 1 line long; petals yellow, ovate from an oblong base; ovary glabrous, rather cylindrical. W. Indies. B.M. 8056.

WOOD BETONY: *Stachys Betonica.* **Woodbine:** In England, *Lonicera Periclymenum;* in America, *Parthenocissus quinquefolia.* **W. Lily:** *Trillium.* **Woodruff:** *Asperula.* **W. Sorrel:** *Oxalis Acetosella.*

WOODS, IN LANDSCAPE: *Planting*, Vol. V, page 2662.

WOÒDSIA (after Joseph Woods, an English botanist, 1776–1864). *Polypodiàceæ*. A genus of mainly rock-loving ferns characterized by their inferior indusium, which is attached beneath the sorus, inclosing it at first but soon splitting into star-like lobes, and later hidden beneath the sorus.—Some 15 species are known, of which 7 grow wild in this country. The following native species are sometimes cult. in borders. Treatment given other hardy ferns will suit them well. Both grow best amongst rocks.

ilvénsis, R. Br. Growing in rosettes or tufts: lf.-stalks dark, polished, jointed about ½in. from the rootstock; lf.-blades 3–8 in. long, 1 in. or more wide, bipinnatifid; segms. crowded, obscurely crenate: sori confluent when old. Eu. and N. Amer. north of Va.

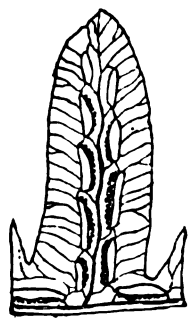
obtûsa, Torr. Lvs. clustered, 6–15 in. long, 2–4 in. wide, minutely glandular-hairy, bipinnate; pinnæ rather remote, triangular-ovate. New England to Ariz.

W. glabélla, R. Br., and *W. alpina*, Gray, are two rare alpine hardy species which have been offered. They are of interest only as rarities in large collections. R. C. Benedict.†

WOÓDWÁRDIA (Thomas J. Woodward, an English botanist). *Polypodiàceæ*. Chain Fern. A group of rather coarse-foliaged ferns of diverse habit and structure, but all bearing the sori in rows arranged parallel to the midrib like links of sausages. See *Fern*.

A. *Lvs. of two sorts, the veins everywhere forming areoles.*

areolàta, Moore (*W. angustifòlia*, Smith). Sterile lvs. deltoid-ovate, with numerous oblong-lanceolate sinuate pinnæ; sporophylls with narrowly linear pinnæ 3–4 in. long. Mich. to Fla., mostly near the coast.—Often and probably better separated under a distinct genus, Lorinseria, on account of its different lvs. and habit of growth.



4008. Fruiting lobe of Woodwardia virginica. (×½)

AA. *Lvs. uniform.*

B. *Veins forming one or more series of areoles.*

radìcans, Smith. Lvs. rising from a short erect st., 3–5 ft. long, gracefully curved; pinnæ 8–15 in. long, 2–4 in. wide, pinnatifid nearly to the midrib. The true *W. radicans* from Eu. bears scaly buds toward the apex of the lf. and roots to form new plants. The Californian and Mexican species, which has often been referred to

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this species, is really distinct and never roots; it is apparently not in the trade.

orientàlis, Swartz. Fig. 4007. Lvs. 4–8 ft. long, 12–18 in. wide, with lanceolate pinnæ and sinuate pinnules; veins uniting freely. Japan and Formosa.

BB. *Veins free between the sori and the margin.*

virgínica, Smith. Fig. 4008. Lvs. arising singly from a long creeping rootstock; lf.-blades 12–18 in. long, 6–9 in. wide on stout stalks; pinnæ linear-lanceolate, 4–6 in. long, cut nearly to the rachis into oblong lobes. Canada to Mich., Ark., and Fla.—Better separated as a distinct genus, Anchistea, on account of its slender long-creeping rootstock, from which the lvs. arise at intervals.

W. spinulòsa, Mar. & Gal. (W. paradoxa, Wright). Resembles W. radicans but has narrower fronds, and veinlets perfectly free from sorus to the margin. Vancouver Isl. to Mex.

L. M. UNDERWOOD.
R. C. BENEDICT.†

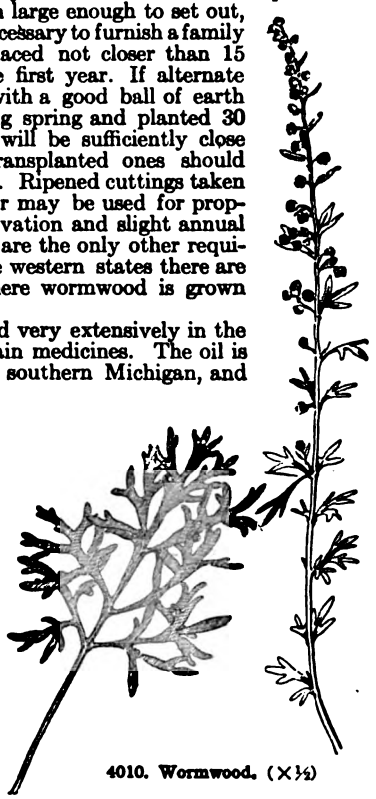
WORMS. Under the names of "worms," "snails," and "caterpillars," various odd fruits of leguminous plants are grown as curiosities. The pods are often put in soups as a practical joke, not for their edible qualities. The plants chiefly grown for this purpose are *Scorpiurus vermiculata,* Linn., *S. subvillosa,* Linn., *S. muricata,* Linn., *S. sulcata,* Linn., *Medicago scutellata,* Mill., and *Astragalus hamosus,* Linn. The last is the one usually known as "worms." The picture, Fig. 4009, shows species of Scorpiurus, chiefly *S. vermiculata* (beneath) and *S. subvillosa* (above). All these various plants are annuals of the easiest culture. They are practically unknown in this country, although offered by seedsmen. See *Caterpillars.*

L. H. B.

WORMWOOD (*Artemisia Absinthium*). Fig. 4010. An erect hardy herbaceous perennial, native of middle and western Europe and the countries that bound the Mediterranean, and sometimes found in waste places as an escape from American gardens, having angular rather shrubby stems 2 to 4 feet tall, which bear abundant much-divided hoary leaves of intensely and persistently bitter flavor, and panicles of greenish or yellowish flower-heads. The seed, grayish and very small, retains its vitality for about four years, but is usually sown soon after harvesting. The tops and leaves, gathered and dried in July and August when the plant is in flower, are officially credited in America with aromatic, tonic, and, as its name implies, anthelmintic properties, although now, for no apparent reason other than caprice of practice, they are less popular with the profession than formerly. In domestic medicine they are employed as mentioned and as a diuretic; locally as a fomentation or as a decoction with vinegar to ulcers, sprains, and bruises. In the dry state they are occasionally placed among clothing as a moth-repellant. Formerly wormwood was used by brewers to embitter and preserve liquors, but at the present time it finds its most extensive use as the principal ingredient in absinthe, in the manufacture of which peppermint, angelica, anise, cloves, and cinnamon are also ingredients. According to Blythe, the green color of this liquor is due not to wormwood but to the chlorophyl of spinach, parsley, or nettles. The plant may be grown without trouble in light dry rather poor garden soil from seed which, owing to its small size, should be started where it may not be washed out or packed down by rain. When large enough to set out, the few specimens necessary to furnish a family supply should be placed not closer than 15 inches each way the first year. If alternate plants be removed with a good ball of earth early in the following spring and planted 30 inches apart, they will be sufficiently close together and the transplanted ones should suffer from no check. Ripened cuttings taken in March or October may be used for propagation. Clean cultivation and slight annual dressings of manure are the only other requisites. In the middle western states there are several localities where wormwood is grown for export.

Wormwood is used very extensively in the manufacture of certain medicines. The oil is produced largely in southern Michigan, and Wisconsin supplies a large acreage.

M. G. KAINS.



4010. Wormwood. (×½)

4009. Pods known as "worms" and "caterpillars," sometimes grown for curiosity and as surprises.

WUÊRTHIA: *Ixia. W. elegans,* Regel, is *Ixia columellaris.*

WULFÈNIA (named for F. X. Wulfen, 1778-1825). *Scrophulariàceæ.* Hardy perennial glabrous or slightly pilose herbs, suitable for the border or rock-garden.

Leaves nearly radical, petioled, crenate: peduncles scape-like, simple: fls. racemose at the top of the scape or spicate, solitary at the axils of the bracts, nodding, blue; calyx 5-parted, segms. narrow; corolla-tube exserted, cylindrical, limb 4-lobed, erect-spreading; stamens 2: caps. acute, septicidally and loculicidally dehiscent, 4-valved.—About 8 species. Eu. and Asia.

Amherstiàna, Benth. Lvs. obovate-oblong or obovate-spatulate, 2–5 in. long, coarsely crenate or lobulate, narrowed at base and subpinnatifid; petioles ½–1½ in. long: scapes 5–10 in. long, slender; racemes long, many-fld.: corolla ⅓in. long. Himalayas. G.W. 9, p. 375.

carinthiaca, Jacq. About 9 in. high: lvs. oblong or oval-oblong, doubly crenate, slightly lobed, narrowed at base, radical few, 3–8 in. long: scape 1–2 ft. long; raceme dense, spike-like, at length elongated: corolla-tube ¼in. long, limb shorter, upper segms. bifid, lower somewhat crenate. Mountains of Carinthia.

W. cordàta, Greene=Synthyris reniformis.

F. TRACY HUBBARD.

WYÈTHIA (named for N. J. Wyeth, North American botanical collector). *Compósitæ.* Hardy perennial herbs, probably adapted to the wild-garden or border. Caudex stout: sts. usually simple, 1-headed: lvs. radical or alternate, entire: heads large, heterogamous; ray-fls. pistillate, in 1 row, disk-fls. perfect and fertile; involucre hemispherical, 2–3 rows of bracts: corolla yellow, rays ligulate, spreading, entire or minutely 2-toothed.—About 7 species, N. Amer. *W. móllis,* Gray. Plant floccose-woolly when young, more or less glabrous when old, 1–3 ft. high, bearing solitary or few heads: lvs. oblong or ovate, base rounded, truncate or cuneate: rays 10–15, over 1 in. long: achenes minutely pubescent at summit. Nev. and Calif. B.M. 7772.

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X

XANTHÍSMA (Greek, *dyed yellow*, referring to the color of the flowers). *Compósitæ*. Summer-blooming yellow-flowered composites.

Annuals or biennials, with alternate, usually entire, narrow lvs.: fls. all fertile, exclusively radiate: achenes top-shaped, 4–5-ribbed or angled; pappus persistent, composed of 10 or 12 rigid bristles which are minutely scabrous above, gradually chaffy-dilated toward the base, and longer than the disk-corolla, as many more one-half shorter, and usually 5 still smaller and shorter external ones.—Two species, of easy cult.

texànum, DC. (*Centauridium Drúmmondii*, Torr. & Gray). Fig. 4011. Nearly glabrous biennial or annual, 1–4 ft. high: lvs. narrowly oblong to lanceolate; st.-lvs. entire or with a few teeth toward the apex: fls. attaining a diam. of 2 in. even in the wild, very showy, composed of a small disk and about 20 rather slender rays. On prairies, Texas.—Suitable for dry open places. In cult. treated like a hardy annual, the seed being sown in the open border early in spring. The second species, *X. Berlandièri*, Small (*X. texànum* var. *Berlandièri*, Gray), also of the prairies in Texas, is probably not cult. N. Taylor.†

4011. Xanthisma texanum. (×½)

XANTHÓCERAS (Greek, *xanthos*, yellow, and *keras*, horn, alluding to the yellow horn-like processes of the disk). *Sapindàceæ*. Ornamental shrub planted for its showy racemes of white flowers and also for the handsome pinnate foliage.

Deciduous: lvs. alternate, odd-pinnate, with narrow serrate lfts.: fls. polygamous, the upper ones of the terminal raceme pistillate, the lower ones staminate, those of the lateral racemes staminate, with rarely a few pistillate ones at the apex; sepals and petals 5; disk with 4 suberect cylindric horns about half as long as stamens; stamens 8; ovary superior, 3-loculed, with a rather short, thick style: fr. a caps., with thick walls dehiscent into 3 valves, each locule with several globose, dark brown seeds.—One species from N. China, allied to Ungnadia and Koelreuteria.

A very handsome shrub or sometimes a small tree with rather finely pinnate dark green and glossy foliage which is not attacked by insects and retains its bright color until frost sets in, and with showy white flowers appearing in upright profusely produced racemes with the leaves on last year's branches. The large greenish fruits are similar to those of the buckeye. It is hardy as far north as Massachusetts and is well suited for solitary planting on the lawn. Xanthoceras is also sometimes used for forcing. It is not very particular as to soil. A porous loamy soil and a sunny position seem to suit it best. Propagation is by seeds, stratified and sown in spring, and by root-cuttings, which succeed best with moderate bottom-heat.

sorbifòlia, Bunge. Figs. 4012, 4013. Shrub or small tree, attaining 15 ft. with rather stout upright branches, glabrous: lvs. 6–12 in. long; lfts. 9–17, usually opposite, sessile, narrow-elliptic to lanceolate, sharply serrate, dark green above, paler beneath, 1–2 in. long: racemes 6–10 in. long: fls. on slender pedicels, white, about ¾in. across, each petal with a blotch at the base changing from yellow to red: fr. green, 1½–2½ in. long; seeds ½in. across. May. N. China. B.M. 6923. F.S. 18:1899. R.H. 1872: 290; 1898, p. 356. Gn. 8, p. 524 (col. pl. not numbered); 34, p. 372; 50, p. 227; 63, p. 407; 65, p. 412; 71, p. 298; 76, p. 121. G.C. II. 26:205; III. 2:274, 275; 11:533; 17: 197; 58:90. G. 27:83; 37: 121. J.H. III. 48:424; 49:210. G.F. 6:285. A.F. 3:109; 12: 36. A.G. 18:357. Gng. 2: 292, 293; 3:289; 12:610, 611. Mn. 1, p. 27. F.E. 17:389. M.D.G. 1900:592, 593; 1909: 499. G.W. 12, p. 425. I.H. 24:295. Gn. W. 21:429.

Alfred Rehder.

XANTHORRHÍZA: *Zanthorhiza*.

XANTHORRHŒA (Greek, *yellow flow*, referring to the resin which exudes from the trunks). *Liliàceæ*. Persistent perennials with a thick woody caudex, adapted to greenhouse culture and which have been tried out-of-doors in the extreme South.

Caudex very short to arborescent: lvs. in a dense tuft at the top of caudex, long-linear, brittle, spreading or recurved: scape or peduncle terminal, often several feet long, terminating in a dense cylindrical spike: fls. greenish, numerous, sessile; perianth persistent, segms. 6, 3 outer glume-like, erect, concave or almost hood-shaped at the top, 3 inner much thinner, erect with the

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outer but more or less protruded beyond them; stamens 6; ovary sessile, 3-celled: caps. protruding from the perianth, ovoid or acuminate, 3-valved, hard, brown and shining.—About 14 species, Austral.

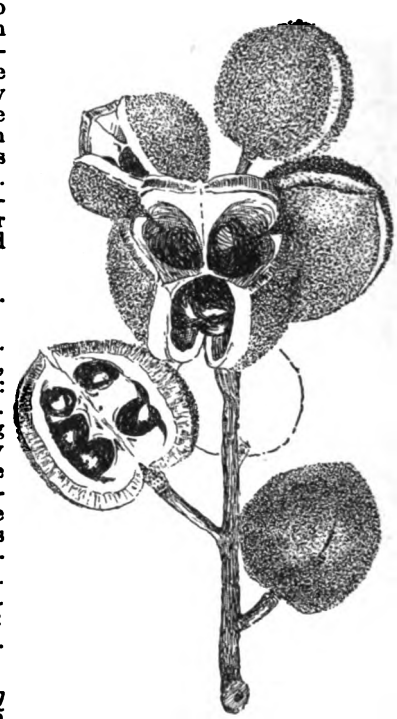
The "grass trees," "grass gums," or "black boys," form a conspicuous feature of the Australian landscape. These picturesque desert plants are well worth trial in the warmer and more arid regions of the United States. The trunk varies from almost nothing in some species to 15 feet in the case of aged specimens of *X. Preissii*. The tall and palm-like trunks are thickly covered with the bases of the old dead leaves, which are cemented together by the black or yellow resinous gum that flows freely from the stems. In Australia the trunks are often charred and discolored by bush fires. The following species have been offered in southern Florida and southern California, but are practically unknown to cultivation in this country. All the species are long-lived perennials native to dry and rocky places. They are said to thrive in a compost of peat and loam and to be propagated by offsets. *X. Preissii* seems to be the most desirable species.

4012. Xanthoceras sorbifolia. (×⅓)

A. *Trunk very short.*

B. *Spike 3–8 in. long.*

minor, R. Br. Lvs. 1–2 ft. long, 1–2 lines wide: scape longer than the lvs.: spike less than ¾in. wide. B.M. 6297.—Belongs to the group in which the inner perianth-segms. have a white blade conspicuously spreading above the outer ones, while in the next two species the inner segms. have a short whitish tip, little longer than the outer and scarcely spreading.



4013. Fruit of Xanthoceras sorbifolia. (×½)

BB. *Spike 1½–2 ft. long.*

hástilis, R. Br. Lvs. 3–4 ft. long, 2–3 lines broad: scape often 6–8 ft. long, not counting the spike. Readily distinguished by the dense, rusty tomentum covering the ends of the bracts and outer perianth-segms. B.M. 4722. G.C. III. 17:196. F.S. 9:868. G. 24: 612. Gn.W. 22:13. R.H. 1914, p. 67.

AA. *Trunk becoming 5–6, or even 15 ft. long.*

Preissii, Endl. Lvs. 2–4 ft. long, 1–2 lines broad, rigid, very brittle when young: scapes 2–6 ft. long, including the spike, which occupies one-half to nearly all its length. B.M. 6933. G.C. III. 39:228.

undulatifólia, Tod. ex Riccobono. Trunk 8 ft. or so high, 12 in. diam.: lvs. in a large crown, 5 ft. long, fragile, sword-shaped, reflexed, rhomboidal in section: scape quite erect, cylindric, about 12 ft. long, with a dense spike of golden yellow fls. Austral.

F. Tracy Hubbard.†

XANTHOSÒMA (Greek, *yellow body*, referring to the stigma). *Aràceæ*. This group is interesting to the horticulturist as containing the handsome variegated stove foliage plant known to the trade as *Phyllotænium Lindenii*, and part of the vegetables known as yautia, malanga, and tanier, a crop to which much of the arable land in Porto Rico is devoted.

Milky herbs of S. and Cent. Amer. with a thick sometimes elongated corm: lvs. arrow-shaped, 3-cut or pedately cut: fls. unisexual, naked; males with 4–6 stamens connate in an inversely pyramidal synandrium with 5 or 6 faces; ovary 2–4-loculed; ovules anatropous.—A genus of 25 species, according to Engler, who has given an account of them in DC. Mon. Phaner., vol. 2 (1879).

Many species of the arum family are noted for their huge corms, some of which are edible after the acrid and more or less poisonous properties are destroyed by cooking. Of this class the best known are the taros (*Colocasia esculenta*, Schott, the common taro of southern Asia and the Pacific islands, and *C. antiquorum*, Schott,

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the Egyptian taro, and the yautias, taniers, or malangas (*Xanthosoma sagittifolium*, and other species of this genus) of the West Indies. The botany of the species of Xanthosoma is confused. The corms and cormels (offsets) of some taros, and the cormels of some varieties of yautia, are free from acridity even in the raw state

4014. Xanthosoma sagittifolium.

as cultivated in southern United States. Yautia corms are strong-flavored and are seldom eaten. The young leaves of colocasia and xanthosoma when properly cooked are said to be equal or superior to spinach.

A. *Caudex a short, thick, erect rhizome.*

sagittifòlium, Schott (*Árum sagittifòlium*, Linn.). YAUTIA. MALANGA. Fig. 4014. A tropical vegetable. "Young plants of this are stemless, but in age, from the decay of the old lvs., an annulated caudex or corm is formed some inches in height, each throwing out stout fibers from the base, and from time to time producing offsets by which the plant is easily prop., or if suffered to remain the plant becomes tufted, and numerous lvs. are produced from the summit of the short, yet st.-like trunks" (B.M. 4989). Lvs. 1–2 or almost 3 ft. long, broadly sagittate-ovate, suddenly and shortly acute at apex, basal lobes obtuse: spathe large, with a creamy white limb. Trop. Amer.—In northern hothouses said to bloom in winter.

AA. *Caudex tuberous.*

Líndenii, Engl. (*Phyllotænium Líndenii*, André). Fig. 4015. Tender variegated foliage plant with large arrow-shaped lvs. marked with white along the midrib and parallel veins which run therefrom to the margin. I.H. 19:88. A.G. 19:573 (1898). G.W. 5, p. 308.—Tuberous plant from Colombia. G. W. Oliver, in his "Plant Culture," remarks that this stove ornamental plant should be more used for decorative purposes than it is at present, for it will stand more rough usage than one would suppose. After a goodly number of leaves have been developed in a warm, moist atmosphere, the plants will maintain a good appearance in a greenhouse temperature and may even be used as house plants. The lvs. are firmer in texture than caladiums. Prop. by division. Before repotting, put the pieces in a warm sand-bed to encourage fresh roots. Lvs. oblong-hastate, with acute basal lobes. A very worthy species for ornament.

X. bataviénsis, Hort. Said to have purple sts. and dark green lvs., with edible tubers.—*X. belophýllum*, Kunth, has a short thick erect rhizome and a cordate-hastate lf. Venezuela. Var. *caracasánum*, C. Koch (X. caracasanum, Schott. Colocasia caracasana, Engl.), has lvs. pale green beneath, the posterior lobes more produced at the apex and the midrib and nerves often rosy. Caracas.—*X. cordátum*, N. E. Br. Lvs. glabrous: tube of spathe green; blade yellow-green outside, rose-tinted at base, whitish inside. British Guiana.—*X. cordifólium*, N. E. Br. Allied to X. sagittifolium, but differing in lvs. being obtusely round-cordate and spadix bearing club-shaped neutral organs. British Guiana.—*X. Hóffmannii*, Schott. Lf.-stalk whitish with dark purple blotches: spathe with green tube, purple inside, the limb white. Costa Rica.—*X. maculátum*, Nichols., is described as having immense pale green lvs. variegated with creamy yellow, the petiole violet-tinted.—*X. Mafáffa*, Schott (Colocasia Mafaffa, Hort.). Closely allied to X. belophyllum, has a similar caudex and a cordate-ovate lf., but the posterior costæ are separated by a right or acute angle, the angle in X. belophyllum being obtuse.—*X. Márshallii* is said to be a very rapid grower, with green lvs. and dark sts.—*X. nuevoleonénse*. Grows to 6 ft. high, and has very large lvs. which stand almost horizontal.—*X. violáceum*, Schott. Lvs. primrose, finally green, sagittate-oblong-ovate, 8–16 in. long, 6–12 in. wide: spathe with a tube 4 in. long, the blade 6 in. long, 3 in. wide.

WILHELM MILLER.
ROBERT A. YOUNG.†

XANTHÓXYLUM: *Zanthoxylum.*

XENIA. When sweet corn is fertilized by pollen from a starchy variety, the grains which result from this union become smooth and hard because packed with starch. In like manner the pollen of a purple-seeded variety like the Black Mexican sweet corn, produces purple seeds on ears which would otherwise have white or yellow seeds, and pollen from a yellow-seeded variety produces yellow seeds on the ears of a white-seeded variety. Such direct effects of the pollen are known as xenia (Focke, 1881). While the phenomenon is best known in Indian corn, it has been demonstrated recently also in rye (von Rümker), in which a green-seeded variety bears yellow seeds if pollinated by a yellow-seeded variety. In both maize and rye, the xenia characters affect only the endosperm (albumen) of the seeds, while characters of the seed-coat show no xenia. The correct interpretation of xenia in maize was given by de Vries (1899) and Correns (1899), and almost simultaneously by Webber (1900). This explanation is briefly as follows: The pollen-tube contains two male nuclei, one of which fertilizes the egg, while the other unites with certain other nuclei of the embryo-sac to form the endosperm-

4015. Xanthosoma Lindenii. Leaves 1 foot or so long.

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nucleus from which the whole of the endosperm is developed. The direct effect of the pollen on endosperm characters is due to this participation of one of the male nuclei in the production of the endosperm. A slightly different phenomenon is seen in peas, in which pollen from a yellow-seeded variety produces yellow seeds in the pods of a green-seeded variety, for here the xenia character resides not in the endosperm, but in the embryo itself. Physiological effects of pollen in causing local disturbances of nutritive or other functions in tissues surrounding the style or ovary, thus affecting the size and quality of the fruits, are not properly included under xenia. Many reported cases of xenia in plants other than those here mentioned are undoubtedly mythical and will not stand the test of careful experimental investigation. The deterioration of melons supposedly caused by growing in the proximity of pumpkins or cucumbers, is doubtless a case of this kind. GEO. H. SHULL.

XERÁNTHEMUM (Greek, *dry flower:* it is one of the "everlastings"). *Compósitæ.* Annual erect herbs, densely pubescent or tomentose, of which *X. annuum* is one of the oldest and best known of the "everlastings" or immortelles.

Heads rayless, but the large involucral scales are petal-like and persistent, giving the plant its value as a subject for dry bouquets: outer fls. few and sterile, inner ones fertile; receptacle chaffy; involucral scales in many series, of various lengths, glabrous; heads solitary on long naked peduncles.—Four or 5 species, Medit. region.

The culture of xeranthemum is very simple. Seeds are usually sown in the open, where the plants are to stand; but they may be started outdoors and the seedlings transplanted. Hardy or half-hardy annuals.

4016. Xeranthemum annuum. (×½)

ánnuum, Linn. Fig. 4016. Annual, 2–3 ft. tall, erect, white-tomentose: lvs. alternate, oblong-lanceolate, acute, entire: heads purple, 1–1½ in. across, the longer scales wide-spreading and ray-like. S. Eu. G. 4: 74, 75.—Runs into many varieties. Var. **ligulòsum,** Voss (*X. plenìssimum* and *X. imperiàle,* Hort.). A double or half-double form. Var. **perligulòsum,** Voss (*X. superbìssimum,* Hort.), has very full double heads. In these and the single types there are white-fld. (var. *álbum*), rose-fld. (var. *ròseum*), and purple-fld. (var. *purpùreum*) varieties. There are also violet-fld. forms. Var. **multifldrum,** Hort. (var. *compáctum*) has a more compact and bushy habit, with somewhat smaller heads. *X. várius,* Hort., is a trade name for mixed varieties. Xeranthemums are considerably used for a certain type of bedding, but they are mostly grown for cutting.

X. inápterum, Mill. (X. erectum, Presl), has white heads, of which the scales are little or not at all open or spreading. S. Eu. to S. W. Asia. L. H. B.

XEROCLÀDIA (*dry branch,* from the character of the growth). *Leguminòsæ.* One species, *X. viridiràmis,* Taub. (*X. Zèyheri,* Harv. *Acácia viridiràmis,* Burch.), of S. Afr., likely to be planted in warm dry regions in choice collections, differs from Acacia in having only 10 (rather than indefinite) stamens, powdery pollen, 5 free petals, and other technical characters. It is described as a small, dry, and very rigid bush 1–2 ft. high, with pale bark, spinous stipules, deciduous bipinnate lvs., and fls. 8–12 in nearly or quite sessile heads: petals oblong; filaments not much exceeding the petals; anthers with a very minute sessile gland: pod or legume semi-orbicular, indehiscent, 1-seeded, about ½in. long, winged.

XERONÈMA (Greek, *dry* and *thread,* referring to the filaments which dry and persist). *Liliàceæ.* Perennial herb, sometimes grown in the warmhouse: rhizome very short: st. erect, simple: lvs. grouped at base of st., elongate, rigidly veined: raceme terminal, simple, secund rachis abruptly bent at base, frequently horizontal: fls. grouped on erect short pedicels; perianth red, showy, about ½in. across, persisting, segms. distinct, linear, erect, 1-nerved; stamens 6; ovary sessile, obtuse, 3-celled: caps. very short-stipitate, loculicidally dehiscent. One species, New Caledonia. *X. Moòrei,* Brongn. & Gris. St. about 20 in. long with a few reduced lvs.: basal lvs. 12–16 in. long, erect: fls. bright crimson; perianth ½–¾in. long; stamens exserted. New Caledonia. B.M. 8342.

XEROPHÝLLUM (Greek, *dry leaf*). *Liliàceæ.* TURKEY'S BEARD. Tall subaquatic hardy perennial herbs not extensively in cultivation.

Rhizome short, thick and woody: sts. erect, tall, simple: lvs. radical or grouped at base of st., long-linear, rather stiff, margin scabrous; cauline lvs. sparse, much smaller: fls. white, numerous, in a terminal raceme; perianth withering, persistent, segms. distinct, oblong or lanceolate; stamens 6; ovary sessile, 3-grooved, obtuse, 3-celled: caps. subglobose, or short-oblong, 3-grooved, loculicidally dehiscent.—Three species, N. Amer. Watson, in Proc. Am. Acad. 14:284.

The turkey's beard of the eastern states (*X. asphodeloides*) is a strong herb, 3 to 4 feet high, resembling asphodel. It has a dense tuft of numerous long, wiry leaves from the center of which springs a stately shaft sometimes 5 feet high, with an oval or oblong raceme 6 inches long, crowded with yellowish white 6-parted flowers, each ¼ inch across. It blooms from May to July, flowers with delicate fragrance lasting a long time. The species is a native of the dry pine barrens from southern New Jersey to eastern Tennessee and Georgia. The chief species of the Pacific coast, *X. tenax,* has white and violet flowers, the latter color supplied by the stamens. Each region should cultivate its own species. The forms are too much alike for the same garden. A third species, *X. Douglasii,* Wats., is a rare plant ranging from Montana to Oregon. It is distinguished by its six-valved capsule and is said to be inferior as a garden plant to the other species.

asphodeloìdes, Nutt. (*Helònias asphodeloìdes,* Linn. *X. setifòlium,* Michx.). Fig. 4017. Tall hardy perennial, 1–4 ft. high: lvs. 1 line or less wide: raceme 3–6 in. long: perianth-segms. exceeding the stamens. Pine barrens, E. U. S. B.M. 748. L.B.C. 4:394. Gng. 1:173. A.F. 7:171. Gn. 27, p. 224; 39:526 and p. 527; 58, p. 15. G.C. II. 13:433.

tènax, Nutt. Two to 5 ft. high: lvs. about 2 lines wide: raceme 1–2 ft. long; pedicels longer: perianth-

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segms. scarcely equaling the stamens. Calif. to Brit. Col. June, July. B.R. 1613 (erroneously as *X. setifolium*). F. TRACY HUBBARD.†

XIMÈNIA (named after Francis Ximenes, Spanish monk, who wrote on plants of Mex. in 1615). *Olacàceæ*. Glabrous or tomentose shrubs or trees, one of which, *X. americana*, occurs native in S. Fla. and is a tropical fr. of minor importance. Branches usually thorny: lvs. alternate, entire, subcoriaceous, usually fascicled: fls. whitish, arranged in short axillary cymes or rarely solitary; calyx small, 4–5-toothed or -lobed, unchanged in fr.; petals 4–5, valvate, narrow, bearded inside; stamens twice the number of petals; ovary 3-celled at base or higher, ovules 3: drupe ovoid or globose, flesh pulpy.—About 5 species, natives of the tropical regions of the world. Here belongs the hog plum which grows wild throughout the tropics, and in the U. S. is native to Fla. south of Tampa Bay. The fr. is about an inch long, shaped like a plum, and the pulp is sweet and aromatic. The "stone" which incloses the seed is proportionately very large. The fr. is borne on a small tree, each branch of which ends in a thorn about ½in. long. The frs. are generally eaten, but although it is fairly common in Fla. it is not cult. The species has been suggested by the American Pomological Society as worthy of cult. with a view to improvement.

americàna, Linn. HOG PLUM. Also called "mountain" or "seaside plum" and "false sandalwood;" "wild olive" in Jamaica. Tropical fruit-bearing tree: lvs. 2–3 together, oblong, obtuse, short-petioled: peduncles 2–4-fld., shorter than the lvs.: fls. small, yellow; petals thick, lanceolate, rusty-hairy within: fr. yellow; nut white, globose. Tropics.—The "hog plum" of Jamaica is *Spondias lutea*. F. TRACY HUBBARD.†

XYLÒBIUM (Greek, *wood* and *life*, in allusion to the substance on which the plants grow). *Orchidàceæ*. Epiphytic herbs, grown in the warmhouse.

Stems short, with many sheaths, soon thickened into fleshy pseudobulbs, which are 1–2-lvd.: lvs. large or elongated, plicate-veined, contracted to the petiole: scapes erect, simple, arising from the base of the pseudobulb: fls. racemose, medium-sized or rather large, very shortly pedicelled; bracts linear, usually rather long; sepals subequal, erect, finally spreading, lateral broader than the dorsal, forming a chin; petals similar to the dorsal sepal if not smaller; labellum somewhat articulate with the foot of the column, lateral lobes erect, surrounding the column, midlobe short, broad, surface smooth, lamellate or callous at the base; pollinia 4, ovoid: caps. oblong, erect.—About 30 species, natives of Trop. Amer.

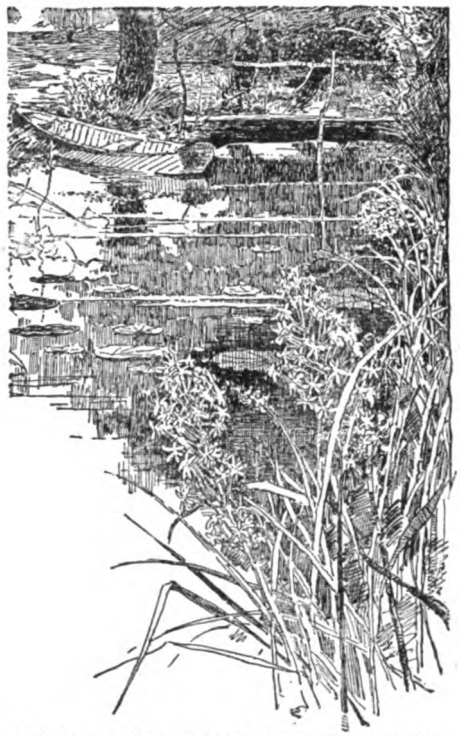
bractéscens, Kränzl. (*Maxillària bractéscens*, Lindl.). Pseudobulbs conical, elongated, sulcate: lvs. broad, folded: scape 3-sheathed; raceme elongated, few-fld.: sepals oblong-lanceolate, they and the similar but smaller petals dull yellow; lip reddish brown, 3-lobed. Peru.

brachystàchyum, Kränzl. Pseudobulbs almost globose, slightly narrowed above, 1-lvd.: lf. oblong, acute, 3-nerved, thick, shining, petiole sulcate, blade 10 by about 4 in.: raceme very short, few-fld.: dorsal sepal broad ovate-oblong; lateral ones much larger, outside dull purple; petals oblique at base, oblong above, dull purple outside, yellow spotted purple inside; lip simple, obovate-oblong, rather acute, slightly fiddle-shaped. Brazil. G.C. III. 40:302 (desc.).

dècolor, Nichols. (*Maxillària dècolor*, Lindl.). Pseudobulbs clustered, oblong, compressed, 1–2 in. long, bearing a single lf.: lf. 12–15 in. long, oblong-lanceolate, plicate and acuminate at both ends: scapes erect, many-fld.: sepals and petals sulfur-colored or shaded with white; lip whitish, obsoletely 3-lobed, obtuse. W. Indies. B.M. 3981. B.R. 1549.

elongàtum, Hemsl. (*Maxillària elongàta*, Lindl.) Pseudobulbs cylindrical, elongated, about 6 in. long, 2-lvd.: lvs. lanceolate, 3-ribbed: scape erect, 2-sheathed, many-fld., infl. a dense oblong raceme: sepals and petals pale yellowish white, linear, acuminate; lip ovate-oblong, very fleshy, purplish brown. W. Indies.

leontoglóssum, Benth. (*Maxillària leontoglóssa*, Reichb. f.). Pseudobulbs fusiform, congregated, 1-lvd.: lf. petioled, elliptic-lanceolate, acute, plicate: scape



4017. Xerophyllum asphodeloides growing near the margin of a pond.

stout, bearing an oblong or cylindrical, dense and nodding raceme: fls. yellow, spotted with maroon; dorsal sepal oblong, lateral sepals oblong-lanceolate; petals similar to lateral sepals; lip oblong, lateral lobes narrow, midlobe rotundate fleshy and marked with purple-brown. Colombia. B.M. 7085.

squàlens, Lindl. (*Maxillària squàlens*, Hook.). Pseudobulbs stout, 2–3 in. long: lvs. 9–12 in. long: scapes densely fld.: sepals and petals yellowish white, petals and midlobe of lip streaked with purple, lateral lobes of lip deep purple. Venezuela. B.M. 2955.

X. stivum, Hort., is offered in the trade.—*X. peruviànum*, Hort., is also offered. F. TRACY HUBBARD.

XYLOPHÝLLA ARBÚSCULA, Swartz: *Phyllanthus speciosus*.

XYLÒPIA (from the Greek *Xylopikron*, bitter wood). *Annonàceæ*. Shrubs and trees grown mostly for their fruits, and also for spices and other products.

The genus resembles other Annonaceæ in having alternate distichous entire lvs., and fls. with 6 petals in 2 series, but distinguished by the form of the torus, or receptacle, which has a concavity in the middle including the carpels, surrounded by a ring of stamens borne on the convex portion of the receptacle: infl. instead of being extra-axillary or lf.-opposed, as in many other genera of the family, consists of short-stemmed or sessile fls. growing from the axils of the lvs., either solitary or in clusters of 2 to several: calyx

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with 3 valvate sepals connate for some distance from the base; outer petals elongate, thick, valvate, and connivent, or scarcely opening, and triquetrous above, inclosing the 3 inner linear petals, which are concave at the base; after anthesis the receptacle undergoes a transformation, its center becomes depressed so as to form a cone-like sac, while its margin grows in such a way as to form a dome with an orifice at its apex; through this orifice protrude the styles, while the ovaries occupy the cavity, and the surface of the dome in most species is covered with the crowded stamens, the expanded connectives of which form a sort of tile-like covering to the pollen-sacs; carpels vary in number and the ovaries have a ventral placenta bearing an indefinite number of ovules primitively arranged in 2 vertical rows: fr. consists of clusters of berries either sessile or shortly stipitate, more or less elongate, often constricted between the seeds, which have a ruminate endosperm, like other members of the Annonaceæ, and in many cases there is an aril on both sides of the terminal umbilicus. In the African species, sometimes separated as a distinct genus under the name Habzelia, instead of a central cavity there is only a slight depression at the summit of the torus or even none at all. In the genus Pseudannona, treated by Baillon as a section of Xylopia, but given generic rank by the writer (see Journ. Wash. Acad. Sci. 3:16. 1913), both the corolla and the fr. differ radically from those of Xylopia. The inner petals form a diminutive acute triquetrous corolla over the essential parts, and the outer ones, much broader and longer, recall by their form and the thickness of their margin the fls. of certain species of Annona, while their few-seeded frs. are thick and fleshy, when mature suggesting the frs. of our common *Asimina triloba*. It is intended here to describe only the species of economic importance.

Xylopia æthiopica, X. Eminii, X. aromatica, X. carminativa, X. frutescens, and *X. grandiflora* are worthy of cultivation for the sake of their spicy fruits; while *X. parvifolia* and *X. nigricans* of Ceylon are desirable for the exquisite perfume of their flowers, which like those of the ilang-ilang (*Canangium odoratum*) might be utilized as a source of an essential oil for use in perfumery. Propagation is possible either by seeds or by grafting and budding, as in the case of other Annonaceæ. Seeds should be sown as soon as ripe in shaded beds and the small seedlings should be transferred to pots and kept until ready for planting out, preferably in good, well-drained soil in sheltered situations.

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A. *American species (Nos. 1–7).*

B. *Lvs. acute or acuminate.*

1. **grandiflòra,** Aubl. (*X. cubénsis*, A. Rich. *X. longifòlia*, A. DC.). MALAGUETO MACHO. MALAGUNTO GRANDE. ZEMBÉ. FRUTA DEL BURRO. ACHON. Fig. 4018. Tree with younger branches rufous-tomentose near extremities: lvs. approximate, distichous, elliptical-lanceolate or oblong, acute at the apex, usually obtuse at the base, puberulous above, tomentose and rufescent beneath, the blade 4 in. or more in length, the petiole about ¼in. long, grooved above, tomentose and rufous: peduncles axillary, very short, 2-fld.; pedicels incurved, bracteate, villous, ferrugineous: fls. often 2 in. long; calyx short, cup-shaped, shortly 3-parted; petals erect, the outer ones linear, acutish, concave at the base, silky near the base, subtomentose above; the inner ones shorter and narrower, linear and triquetrous, acute, expanded and shell-like at the concave base, so as to cover the essential parts; receptacle hollowed in the center, forming a cavity in which the ovaries are included, the styles protruding beyond its opening. A wide geographical range, which has undoubtedly been extended through human agency. It is spread in S. Amer. from Brazil to Panama and also occurs in Cuba, where it is known as Malagueta brava, or "wild melegueta," and Guacima Maria, or St. Mary's guacima."—Varies considerably in the size and pubescence of its lvs. According to Baillon the frs. of this species, together with those of *X. frutescens* and *X. sericea* (*X. carminativa*), are offered for sale in the pharmacies of Brazil. They contain large cells filled with a volatile aromatic oil, having a pepper-like flavor, but more agreeable and delicate than pepper. Martius regards these frs. as worthy of intro. into the pharmacopœia, on account of their tonic and carminative properties.

2. **carminativa,** R. E. Fries. (*Unòna carminativa*, Aruda da Camara. *X. sericea*, St. Hil.). PAO D' EMBIRA. PINDAIBA. PIMENTA DE MACACO. A tree closely allied to *X. grandiflora*, but with the lvs. narrower in comparison with their length, and with the apex more attenuate and the base more acute, but the latter varies and is sometimes rounded; lf.-blade clothed with appressed silky hairs longer than those of *X. grandiflora*, and usually smaller than the latter, but also varies in size: fls. much smaller than those of *X. grandiflora*, scarcely exceeding ½in. in length, and serving at once to distinguish the two species: frs. either rounded at the tip or pointed, shorter than those of *X. grandiflora*, and usually containing 3 or 4 seeds, but sometimes only 1 or 2, in the latter case they resemble the frs. of *X. frutescens*, from which, however, they may be distinguished, when dry, by their black color and rough surface. Ranges from Minas Geraës in Brazil to British Guiana.—The seeds are commonly found in apothecary shops in Brazil, where they are sold as carminatives. According to St. Hilaire the bark is stringy and tenacious and is excellent for cordage, especially for boat-cables. The frs. have the odor and taste of pepper and are used as a condiment, but are not so pungent as pepper. Specimens were purchased at Januaria, state of Minas Geraës by Messrs. Popenoe, Shamel, and Dorsett, of the U. S. Dept. of Agric. during their recent mission to Brazil.

3. **frutéscens,** Aubl. MALAGUETA HEMBRA. MALAGUNTO CHICO. COUGNERECOU (Carib name). JEJERECOU (Cayenne). EMBIRA. PINDAIBA (Brazil). Fig. 4018. A shrub or small tree with distichous branches; new branchlets pilose, reddish: lvs. oblong-lanceolate, acuminate at the apex, with the tip of the acumen obtuse or rounded, and the margins revolute, above glabrous, beneath silky with white, appressed, sericeous hairs: peduncles pilose, very short, bracteolate, solitary, or in 2's or 3's, growing from the axils of the lvs.: calyx pilose, with the divisions ovate acute; petals oblong, never opening widely, sericeous on the outside: frs. glabrous, aromatic. Endemic in Brazil, Venezuela, Guiana, Colombia, and Panama.—Collected at Gatun by Hayes, who states that "the negroes of the Isthmus use the red berries of this small tree as a substitute for pepper and the bark for making ropes." Specimens in the National Herbarium were recently collected by Henry Pittier in the Canal Zone, and bear the common name "malagueta hembra," to distinguish them from the fr. of the "malagueto macho." The name malagueta, sometimes modified to malagunta, undoubtedly comes from Afr., where it is applied to the so-called "grains of paradise" (*Amomum Melegueta*, Roscoe), a famous spice of the west coast of Afr.

4. **muricàta,** Linn. (*X. jamaicénsis*, Griseb.). SMALLER BITTER-WOOD. Fig. 4018. A shrub with ovate or lanceolate, long-acuminate lvs., with the slender acumen often obtuse at the tip, clothed beneath with

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strigóse hairs, and bearded at the tip: fls. small, in axillary clusters: berries punctate.—This species, the type of the genus Xylopia, was based by Linnæus on a plant growing in the mountains of Jamaica described and figured by Patrick Brown in his Natural History of Jamaica, and called by him Xylopicrum, on account of the bitter taste of its wood. The vernacular name was applied to it to distinguish it from *X. glabra*, Linn., a species based on Plukenet's *Xilopicron*, or *Lignum amarum*, of Barbados, commonly called bitter-wood.

5. **discrèta,** Safford (*Unòna discrèta*, Linn. f. *Habzèlia discrèta*, A. DC.). PEYRICOBOOM. A shrub or small tree with privet-like, or willow-like lvs. and

4018. Xylopia.—*a–e*, X. grandiflora, showing flower-bud and leaf at *a*, section of flower with cavity in receptacle at *b*, fruiting branch at *c*, four-seeded fruits, *d*, *e*; *f*, X. frutescens, fruiting branch; *g*, X. muricata, type of the genus; *h*, X. obtusifolia, fruit and three leaves. (*b* nat. size; others × about ⅓.)

slender, flexible, virgate branches: lvs. alternate, short-petioled, 2-ranked, narrowly oblong-lanceolate, about 1 in. long, clothed beneath with appressed silky hairs: fls. resembling those of an Annona but with the carpels distinct and stipitate, developing into a cluster of berries borne on the center of the indurated receptacle: berries purple, aromatic, oblong-linear, 1-3-seeded, more or less constricted between the seeds; the latter ovate-globose, smooth and glossy.—This species was first described by the younger Linnæus from a tree growing in Surinam, or Dutch Guiana, and proposed by him as the type of a new genus Unona. It proved, however, to be congeneric with Xylopia. The name Unona was afterward applied to an Asiatic genus previously described by Loureiro as Desmos, but according to the laws of botanical nomenclature, was not available for the name of a second genus. The generic name Desmos is therefore valid, and must be used for the Asiatic plants commonly called Unona. (See *Desmos*, Vol. II, p. 991 of this work.)

6. **aromática,** Baill. (*Habzèlia aromática*, A. DC. *Wària zeylánica*, Aubl.). MANIGUETTE. BOIS D' ECORCE. POIVRE DES NÈGRES. A tree with a trunk 20 ft. high or more, with a spreading crown and leafy branches: lvs. ovate or oblong-acuminate, glabrous, subsessile: fls. axillary, solitary or in pairs; calyx-divisions subrotund-ovate, acute, fleshy; petals 6, the 3 outer ones longer, ovate-oblong, on the outside villous, cinereous, on the inside glabrous, violet-colored, the 3 inner ones smaller, glabrous, violet-colored: berries reddish, numerous (12–25 in a cluster), oblong, subterete, shortly stipitate, with a longitudinal seam down one side; constricted between the seeds; seeds 3–6, orbiculate, reddish.—A species of doubtful relationship, owing to its broad petals and orbiculate seeds. It has been referred to *Unona concolor*, Willd., and may possibly be congeneric with Desmopsis or Unonopsis. The type, described by Aublet under the name *Waria zeylanica*, was collected in the forest of Timoutou, French Guiana.

BB. *Lvs. obtuse or rounded at the apex.*

7. **obtusifòlia,** A. Rich. (*Habzèlia obtusifòlia*, A. DC.). GUIMBA. GUAVICA. GUAVICO DE SAVANA. PICO DE GALLO. Fig. 4018. A shrub or small tree with numerous crooked branches, the extremities of which are ferrugineous-pubescent when young. It differs from all other species here described in its perfectly glabrous lvs., which are quite obtuse or rounded at the apex and obovate or subspatulate in outline, coriaceous, pale green and glossy above and paler beneath, and about 1–1½ in. long: fls. axillary, solitary, very shortly peduncled, subtended by small scale-like bracteoles; calyx-divisions broad, subacute, and ciliate along the margin; outer petals narrowly linear, acutish, dilated and concave at the base, covered on the outside with rufous silky hairs; inner petals shorter and narrower, triquetrous above, expanded and concave at the base, covering the essential parts; carpels included in the cup-like hollow of the receptacle, numerous, but usually only 2–8 developing into fr.; the latter a cluster of terete follicles more or less constricted between the 2–4 seeds, which have a whitish fleshy aril on each side of the hilum.—This plant is known only from the Island of Cuba, where it is prized for its fine yellow wood. Its local name Pico de gallo (cock's beak) is suggested by the form of its sharp elongated fl.-buds.

AA. *Asiatic species.*

8. **parvifòlia,** Hook. f. & Thom. (*Patònia parvifòlia*, Wight. *Unòna tripetaloidea*, Moon). NETAWU. ATUKÉTIYA. A tall aromatic tree of Ceylon, with a straight trunk, smoothish bark, and silky shoots and young branches: lvs. oval, acuminate, acute at the base, 3–5 in. long, glabrous; petiole ¼ in., finely pubescent: fls. axillary, solitary or in clusters of 2 or 3 on very short peduncles bearing several short imbricated scale-like bracteoles; calyx-divisions small, broad, united half-way up, acute, pubescent; petals hairy, the outer ones linear, strap-shaped, acute, hollowed at the base; the inner a little shorter, thick, trigonous, expanded and hollowed at the base, covering the essential parts; stamens truncate; carpels 5, sunk in the center of the receptacle; ovules 4–6 in two rows: fruiting carpels 1–4 on very short thick stalks, broadly ovoid, 1–1½ in. long, containing several smooth brown oblong seeds.—This species is common in the moist low country near Colombo, Ceylon. Its bark, especially that of the root, its yellow fls., and the fr. are all delightfully sweet-scented and aromatic, and are chewed by the natives with their betel. The wood is

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yellowish gray and soft. Two other Ceylon trees with fragrant yellow fls. are *X. nígricans*, with the calyx-divisions divided almost to the base; and *X. Championii*, with blunt ovoid fl.-buds.

AAA. *African species.*

9. **æthiòpica,** A. Rich. (*Unòna æthiòpica*, Dunal. *Habzèlia æthiòpica*, A. DC.). GUINEA PEPPER. NEGRO PEPPER. HABB SELIM. GRAINS OF SELIM. AKOLA. BIKUÈ. A leafy tree of moderate height: lvs. coriaceous, glabrous and glossy above, finely appressed pilose beneath, oblong-elliptic or oblong, obtuse or narrowed at the base and more or less acuminate at the apex: fls. solitary or in clusters of several, short-pedicelled; calyx with the segms. broadly triangular and acute; petals on the outside fulvo-sericeous, linear, subconcave at the dilated base, the outer ones with thick margins, the inner ones narrower, triquetrous; stamens with the dilated connective puberulous, outer circle of stamens sterile, a little broader than the fertile ones; carpels numerous; ovules 6–8 in a single series; mature carpels subsessile, slender, cylindrical, somewhat incurved, about 2 in. long, slightly constricted between the seeds, glabrous, vermilion-colored within; seeds 6–8, of medium size, ellipsoid, about ⅕in. long and half as thick.—This species is endemic in W. Afr. where its fr. is used as a substitute for pepper. It was known to old authors under the name *Piper æthiopicum*. Closely allied to this species and similarly used are *X. niamniaménsis* of Cent. Afr., formerly brought by caravan across the Sahara to the shores of the Medit., and *X. Éminii*, Engler, of the Uganda. So precious are these spices held, not only for seasoning food but for use as carminatives and stomachics, that in certain districts of Afr. they are circulated as money.

W. E. SAFFORD.

XYLÓSMA (Greek, *xylos*, wood, and *osme*, odor; alluding to the aromatic wood of some species). Syns., *Myróxylon*, *Hisingera*. *Flacourtiàceæ*. About 45 species of evergreen, often spiny, trees or shrubs distributed throughout the tropical and subtropical regions of both hemispheres except Afr. Lvs. alternate, short-petioled, usually dentate, exstipulate: fls. small, in axillary racemes, usually dicœcious, apetalous; sepals 4–5, slightly connate at the base; stamens many, distinct, surrounded by a disk; ovary superior, surrounded by a disk and sometimes by staminodes, 1-celled with several ovules; styles 2–3, usually connate. Little known in cult.; prop. by seeds and probably by cuttings of half-ripened wood under glass.

racemòsa, Miq. (*Hisingera racemòsa*, Sieb. & Zucc. *Myróxylon racemòsum*, Kuntze). TUNG-CHING TREE. Small tree or shrub, unarmed or spiny, glabrous: lvs. ovate, acuminate, rounded at the base, serrate, 1½–2 in. long: fls. yellow, fragrant, scarcely ¼in. across, in axillary racemes ⅓–1 in. long: fr. globose, ⅕–¼in. thick, black, 2–3-seeded. Aug., Sept.; fr. in Nov., Dec. Japan, Korea, E. China. S.Z. 1:88. Var. **pubéscens,** Rehd. & Wilson. Tree, to 80 ft.: branchlets pubescent: lvs. ovate to oblong-ovate, glabrous, 1½–3 in. long. Cent. and W. China.—Only this variety seems to be in cult. and Wilson pronounces it one of the handsomest evergreen trees of China; it has proved hardy in S. England and probably will do well in the southern states and Calif.

Sálzmannii, Eichl. Shrub, to 15 ft., glabrous, the sts. and older branches armed with stout branched spines: lvs. chartaceous, ovate to ovate-oblong, obtuse or obtusely acuminate, cuneate at the base, crenate-dentate, 1½–4 in. long: fls. greenish yellow, fascicled; sepals ciliate; disk of the pistillate fl. annular; styles 2, 2-parted at the apex: fr. black, 3–4-seeded. Brazil, Argentina, Paraguay.

X. Aquifòlium, Sprague. Lvs. holly-like or occasionally nearly entire, having pair of glands at base of blade, 2–4 in. long: racemes short, axillary, of very small fls.: styles 6–7. Habitat unknown, probably Polynesia or Austral. ALFRED REHDER.

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Y

YAM. The name yam properly belongs to the members of the genus Dioscorea, although unfortunately it has been applied for many years in the United States to the large varieties of the sweet potato, *Ipomœa Batatas*. The name as applied to the sweet potato is thought by some to be a corruption of an African word pronounced "nyam," brought by the negroes who were transported to America in the early days. This word was used for the true yam or other large roots or tubers used for food in Africa and was bestowed by the negroes on the large sweet potatoes in America.

The botany of the cultivated yams has not been cleared up. Many varieties are of mediocre quality, while some are excellent, being superior in flavor and mealiness to almost any other starchy vegetable. Single roots or tubers of some varieties, particularly of *D. alata*, attain great size, occasionally even reaching 100 pounds or more in weight, and several feet in length. The best varieties, however, are of small size, often less than a pound in weight. Among the best known of these are the yampis of Jamaica and the Isthmus of Panama, and other varieties of similar quality, such as the cush-cush of the Island of Trinidad. The Chinese yam or cinnamon vine, *D. Batatas*, is of excellent flavor, but on account of its deep-growing habit is very difficult to dig. Several kinds of yam are grown scatteringly in Florida. For further discussion, see *Dioscorea*.

ROBERT A. YOUNG.

YARROW: *Achillea*.

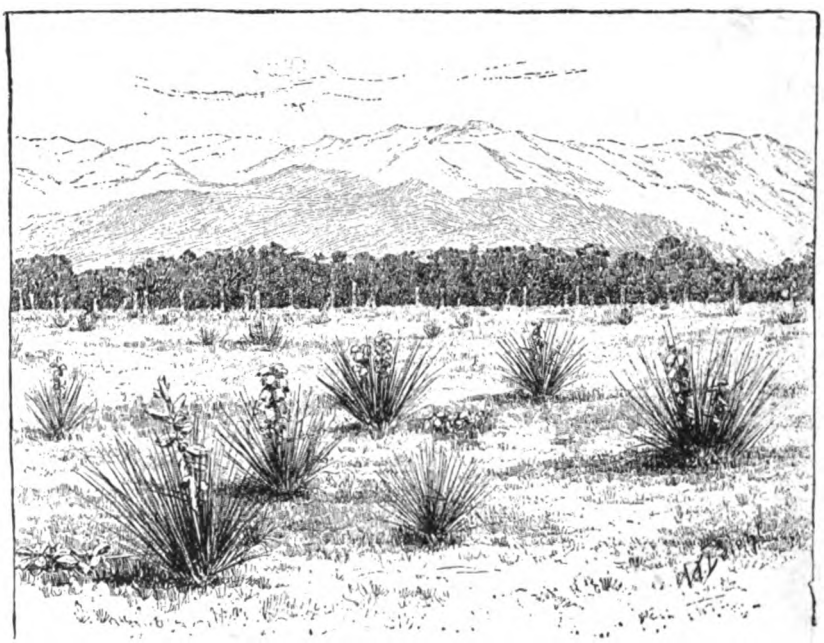
YELLOW-WOOD: *Cladrastis*.

YEW: *Taxus*.

YŬCCA (*Yùca*, native name for the manihot or cassava, erroneously applied to the present plants by Gerarde). *Liliàceæ*, tribe *Yúcceæ*. Bold stiff-leaved plants suitable for lawn planting, subtropical massing, and a few of them for flower-garden use.

Acaulescent to arboreous endogens with fibrous evergreen sword-shaped lvs. usually pungent and often denticulate or fibrous on the margin: fls. white or shaded with cream or violet, cup- or saucer-shaped, usually pendent in large usually erect panicles, opening at night and then somewhat sickishly fragrant; pollination rarely occurs except through the aid of a small white moth, *Pronuba yuccasella*, found wherever yuccas occur wild on the continent, which deliberately gathers the pollen and thrusts it into the stigmatic chamber, its larvæ feeding exclusively on the maturing seeds of these plants: fr. either capsular and erect or fleshy and hanging in the principal groups or subgenera.—About 30 species, confined to N. Amer. and the W. Indies, most of them native to the arid S. W. U. S. and the Mexican tableland. A few species have been cult. for centuries, and within the last decade a large number of artificial hybrids have been produced and intro. into cult., especially along the Medit. There are recent monographs by the writer in Rep. Mo. Bot. Gard., Vol. 13, pp. 42–116, with illustrations, and by Molon in a small manual "le Yucche," Milano, 1914, in which many of the Sprenger hybrids are also figured. See *Hesperoyucca*, *Samuela*.

Propagation is by seeds, offsets, stem-cuttings or rhizome-cuttings. These should be planted in well-drained sandy loam, usually in the succulent house. The only species hardy where frost is severe are *Y. glauca*, *Y. filamentosa*, *Y. flaccida*, *Y. baccata*, *Y. recurvifolia*, and *Y. gloriosa*, which flower in the sequence given, the last-named often blossoming late in autumn. *Y. Treculeana* shows considerable resistance to frost. The tender species are kept in the cactus house. Well-drained sandy loam suits yuccas best, but with good drainage they are tolerant of a large range of soil and exposure. *Y. Treculeana* blooms usually in March in plant-houses, as when wild, and the Mexican species when brought to flower are usually spring bloomers, but they often refuse to flower for long periods and then suddenly and unexpectedly produce an abundance of simultaneous bloom, even on the smaller plants. Of the hardy species, *Y. glauca* flowers in June and it is quickly followed by *Y. filamentosa* and *Y. flaccida*, while the forms of *Y. gloriosa*, which usually flower only at intervals of several years, bloom from late August to so late in the autumn as to be cut down by frost. The only well-known yucca in northern gardens



4019. Yucca glauca in Colorado.

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is the common Adam's needle, *Y. flaccida*. This persists for years, sending up a tall panicle of cream-white flowers in late spring or early summer. All yuccas are suited to bold and formal effects in gardening; as tub specimens they may be used effectively in subtropical bedding or massing.

Most yuccas may be fertilized if fresh pollen is transferred directly from the anther to the stigmatic cavity of a newly opened flower, preferably one seated directly on the main shaft, where nutrition is more certain. *Y. aloifolia* commonly fruits freely, but the others rarely fruit spontaneously in cultivation except *Y. filamentosa* and *Y. flaccida*, which are pollinated by the small white moth (*Pronuba yuccasella*) that accompanies them when cultivated in the western states, but emerges from the pupa too late to pollinate *Y. glauca* and disappears too early for *Y. gloriosa*. See Rep. Mo. Bot. Gard. 3:99; 4:181, for additional discussion.

4020. Yucca radiosa.

The great yuccas, or "yucca palms," of southern California are chiefly *Y. arborescens*. They grow in the higher lands bordering the Mojave and adjacent deserts, reaching a height of 15 to 20 feet. The old plants are exceedingly weird and picturesque. Occasionally this species is transferred to gardens, but it is apparently not in the trade. This "Joshua tree" is now separated as *Clistoyucca arborescens*, Trelease; as it is not in cultivation, it need not be discussed further here except to say that Clistoyucca differs from Yucca in its very short style, fleshy incurved perianth, and spongy dry indehiscent fruit.

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A. *Lvs. not toothed, with fine marginal threads: fr. capsular.*

B. *Style swollen, green.*

1. **glauca**, Nutt. (*Y. angustifòlia*, Pursh.). Fig. 4019. Acaulescent or with prostrate trunk: lvs. narrow, ¼–½in. wide, gray-green, narrowly white-margined: infl. 3–6 ft. high, rarely branched: fls. greenish white. S. D. to N. Mex. B.M. 2236. F.E. 14, p. 34. G.F. 2: 247 (adapted in Fig. 4019). Rep. Mo. Bot. Gard. 3:8, 51; 13:23–25, 83. Gn. 76, p. 402. G.W. 10, pp. 83, 214.—A distinctly caulescent erect form with larger branched infl. is var. **stricta**, Trel. (*Y. stricta*, Sims). B.M. 2222. Gn. 8, p. 130. Rep. Mo. Bot. Gard. 13:26, 27.

BB. *Style oblong, white.*

2. **radiosa**, Trel. (*Y. angustifòlia radiòsa*, Engelm. *Y. angustifòlia elàta*, Engelm. *Y. elàta*, Engelm.). Fig. 4020. Short-trunked or up to 15–20 ft. high: lvs. ¼–½in. wide, gray-green, narrowly white-margined: infl. panicled, long-stalked: fls. white. S. Ariz., W. Texas, and Mex. G.F. 2:569 (adapted in Fig. 4020). B.M. 7650. S.S. 10:504. Rep. Mo. Bot. Gard. 3:9; 4:10, 15, 22; 13:21, 22, 83, 86.

3. **filamentosa**, Linn. ADAM'S NEEDLE. Figs. 4021, 4022. Acaulescent: lvs. 1 in. wide, scarcely glaucous, with curly threads: infl. long-stalked, 4–12 ft. high, usually glabrous: fls. nearly white: carpels with rounded backs. S. C. to Miss. and Fla. B.M. 900. Redouté, Lil. 5:277, 278. Mordaunt, Herb. Gén. 4:258. Rep. Mo. Bot. Gard. 13:8–12, 83. G.C. III. 57:187. G. 34: 605.—A variegated form is f. **variegàta**, and a form with broad stiff spoon-like lvs. is var. **concàva**, Baker (*Y. concàva*, Haw.). Rep. Mo. Bot. Gard. 13:10, 83.

4. **flaccida**, Haw. Differs from the preceding, for which it is commonly grown, in its more flaccid recurving lvs. with slenderer straighter threads, and carpels with angular backs. N. C. to Ala. Gn. 58, p. 447; 78, p. 433. Rep. Mo. Bot. Gard. 13:12–17, 83.—A distinctly glaucous form, much cult. as *Y. filamentosa*, is var. **glaucéscens**, Trel. (*Y. glaucéscens*, Haw.). B.M. 6316 (as *Y. orchioides* var. *major*). Ref. Bot. 324. Rep. Mo. Bot. Gard. 3:10; 13:12–15, 17, 83. A transiently variegated form of this is f. **lineàta**.

4021. Adam's needle.—Yucca filamentosa. (From a plant 4 feet high)

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AA. *Lvs. not toothed, with marginal threads: fr. fleshy.*

5. **baccàta,** Torr. Nearly acaulescent: lvs. 2 in. wide, very rough and concave, with coarse threads: infl. erect, 3 ft. high: fls. very large (3 in. long): fr. sometimes 8 in. long. S. Colo. to New Mex. and Nev. R.H. 1887, p. 368. G.C. III. 28:103. Gn. 16, p. 517; 35, p. 585. I.H. 20:115. Rep. Mo. Bot. Gard. 13:68, 69, 85. G.Z. 21, p. 78.

4022. Flowers of Yucca filamentosa. (×½)

6. **austràlis,** Trel. (*Y. baccàta austràlis,* Engelm. *Y. filífera,* Chab.). Becoming a large tree: lvs. 1 in. wide, smooth, rather flat, with short coarse threads: infl. hanging, 3–6 ft. long: fls. and fr. small. E. Cent. Mex. R.H. 1876, p. 433; 1884, p. 53; 1910, p. 401. Gn. 10, p. 554. G.F. 1:78. Bull. Soc. Tosc. Ort. 14:9. Contr. U. S. Nat. Her. 5:38. Rep. Mo. Bot. Gard. 3:3, 4; 13: 60, 61, 85. G.W. 10, pp. 84, 631.

AAA. *Lvs. entire, transiently denticulate, or slightly filiferous.*

B. *Fr. fleshy.*

7. **Treculeàna,** Carr. (*Y. áspera,* Regel. *Y. longifòlia,* Buckl. *Y. Vandervinniàna,* Koch. *Y. argospàtha,* Verlot. *Y. agavoìdes, Y. contórta,* and *Y. cornùta,* Hort.). Fig. 4023. Small tree: lvs. 1–2 in. wide, rough, very concave, at first entire or slightly denticulate, becoming sparingly filiferous: infl. with large bracts below. Texas to E. Mex. H.F. II. 6:236. R.H. 1869, p. 406; 1887, p. 368. Gn. 12:328; 35, p. 585. S.S. 10:498. Rep. Mo. Bot. Gard. 13:52, 84. G.F. 1:55 (adapted in Fig. 4023). The broader-lvd. form is var. **canaliculàta,** Trel. (*Y. canaliculàta,* Hook. *Y. revolùta,* Hort. *Y. undulàta,* Koch). B.M. 5201. Rep. Mo. Bot. Gard. 13:53, 54. Gn. 73, p. 254.

BB. *Fr. dry but indehiscent.*

8. **gloriòsa,** Linn. (*Y. acuminàta,* Sweet. *Y. gloriòsa acuminàta,* Carr. *Y. intégrrima,* Stokes). Short-trunked or arboreous: lvs. 2 in. wide, stiff, smooth, nearly flat, usually with a few teeth when young or a few threads when old: fls. often reddish tinged: fr. drooping. Coast, from S. C. to Fla. Duhamel, Arbr. 325. R.H. 1877, p. 287. S.S. 10:503. G.C. III. 28, p. 262. Gn. 49, p. 218. Rep. Mo. Bot. Gard. 13:43, 44, 84. A smaller form is f. **minor,** Carr. Rep. Mo. Bot. Gard. 13:45. Ref. Bot. 5:319. A form with median variegation is f. **mèdio-striàta.** F.S. 23:2393, 2394. Forms with the outer lvs. somewhat recurving are var. **robústa,** Carr., B.M. 1260. Redouté, Lil. 6:326, 327, and its more glaucous form f. **nóbilis,** Carr. (*Y. Ellacòmbei,* Baker. *Y. gloriòsa Ellacòmbei,* Baker). Ref. Bot. 5:317. With glaucous lvs. very plicate toward the end it is var. **plicàta,** Carr., Gn. 31, p. 161; 45, p. 45; 49, p. 332. G.C. II. 19:821; III. 8:692; 15:304. Maund, Bot. Gard. 3:286, a taller greener-lvd. form of which is f. **supérba,** Baker (*Y. supérba,* Haw.). B.R. 1690. G.C. II. 12:689. Gn. 33, p. 202; 58, p. 446. Rep. Mo. Bot. Gard. 3:7; 13:46, 84.

9. **recurvifòlia,** Salisb. (*Y. gloriòsa recurvifòlia,* Engelm. *Y. recúrva,* Haw. *Y. péndula,* Groenl. *Y. gloriòsa móllis,* Carr. *Y. gloriòsa planifòlia,* Engelm.). Short-stemmed: lvs. 2 in. wide, flat, recurved, green: fr. erect. Coast of Ga. and Miss. Salisb. Parad. Lond. 31. Ref. Bot. 5:321. Gn. 1, p. 238; 8, p. 136; 47, p. 337. J.H. III. 42, p. 246. R.H. 1858, p. 434; 1859, p. 490. Rep. Mo. Bot. Gard. 13:46, 47, 84.—A form with median yellow variegation is f. **variegàta,** Trel., and one with a reddish stripe is f. **élegans,** Trel. I.H. 30:475.

BBB. *Fr. not known.*

10. **flexílis,** Carr. Scarcely differs except in its narrower lvs. and long-stalked infl. R.H. 1859, p. 400. Gn. 8, p. 129. Rep. Mo. Bot. Gard. 13:47. Ref. Bot. 5:318.

11. **De Smetiàna,** Baker. Caulescent, 5–6 ft. high: lvs. stiffly recurved, short, 1–1½ in. wide, purplish, crowded, resembling those of a lily, sometimes slightly rough-margined at base: fls. and fr. unknown. Mex.(?). Rep. Mo. Bot. Gard. 13:48.

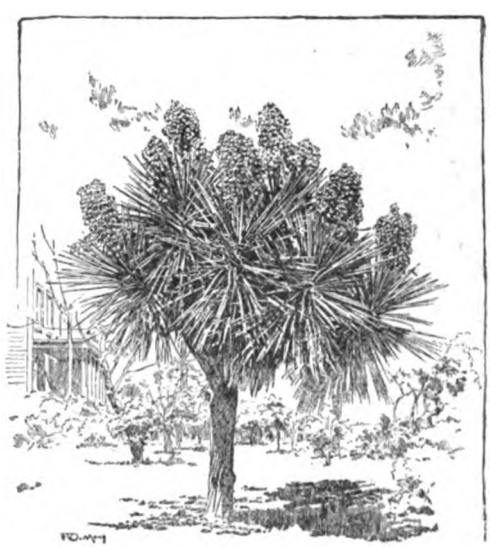
AAAA. *Lvs. sharply rough-edged: fr. fleshy.*

12. **aloifòlia,** Linn. (*Y. serrulàta,* Haw. *Y. crenulàta,* Haw.). Slenderly caulescent: lvs. dagger-like, very pungent: fr. black-purple, without a core. W. Indies and Mex. to Va. and around the Gulf. D C. Pl. Gr. 1:20. Redouté, Lil. 7:401, 402. B.M. 1700. S.S. 10:497. Rep. Mo. Bot. Gard. 3:7, 44; 4:18; 6:45–7; 13:49, 84. With lvs. yellow-margined it is f. **marginàta,** Bommer. Naudin, Pl. Feuill. Col. 2:52. G.W. 18:207. With lvs. yellow or white in the center it is f. **tricolor,** Bommer, also often known as *Y. tricolor, Y. quadricolor,* because shaded with red when young, and *Y. mèdio-pícta. Y. aloifòlia Menándii,* Trel., is a very narrow-lvd. form of this. Rep. Mo. Bot. Gard. 13:50.

13. **elephántipes,** Regel (*Y. guatemalénsis,* Baker. *Y. Lenneàna,* Baker. *Y. Mooreàna, Y. Ghiesbréghtii,* and *Y. Roèzlii,* Hort. *Dracæna Lenneàna, D. Lénnei, D. Ehrenbérgii, D. Fintelmánni,* and *D. yuccoìdes,* Hort.). Becoming a rather large tree with swollen base: lvs. not pungent, 2–3 in. wide: fr. yellow. S. E. Mex. Ref. Bot. 5:313. B.M. 7997. Gn. 67, p. 178. G.C. III. 18: 523. Rep. Mo. Bot. Gard. 4:1, 2, 19; 13:51, 82, 84.—*Y. gigantèa,* Lem., planted in the Azores and around the Medit., is scarcely different. Rep. Mo. Bot. Gard. 9:40–42.

Y. Drèco=Y. flaccida × Y. aloifolia.—*Y. karlsruhénsis*=Y. filamentosa × Y. glauca.—*Y. rekowskiàna*=Y. filamentosa × Y. gloriosa.—*Y. Whipplei*=Hesperoyucca.

WILLIAM TRELEASE.



4023. Yucca Treculeana.

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Z

ZALÁCCA (said to be the name of the genus in the Moluccas). *Palmàceæ*. Stemless palms with creeping roots, adapted to the warmhouse. Lvs. elongated, equally pinnatisect; segms. alternate, fascicled or equidistant, lanceolate or oblanceolate, straight or falcate, acuminate; rachis obtusely 3-angled, not produced into a spine; petioles rather terete, usually with spirally disposed prickles; sheaths strongly armed with compressed prickles; ligule none: spathes persistent, the lower ones sheathing the peduncle and branches, incomplete, the partial ones subtending the floriferous branchlets; spadices simple or fastigiately branched, pendulous, floriferous branchlets catkin-like, rather short, remote or clustered, sessile or pendulous: fls. polygamous-diœcious, usually rose-colored: fr. globose, turbinate or ovoid, 1–3-seeded, usually beaked.—About 14 species, Assam and Malay. Two forms have been sometimes cult. *Z. edùlis*, Blume (*Z. Blumeàna*, Mart.). Lvs. copious, clustered, erect, clothed with long, often serrate prickles; pinnæ linear-lanceolate, very long-acuminate, 1½–2¼ ft. long, 1½–2 in. broad, whitish beneath; petiole rather shorter than the rachis and armed with robust prickles: spadices drooping, long-branched: fr. fulvous-fuscescent, pyriform, 2½ in. long. Malay Archipelago. Var. *Wallichiàna*, Mart. (*Z. Wallichiàna*, Mart.), has lvs. 18–20 ft. long, clustered, nearly erect; pinnæ fascicled in 2's, 3's, or 4's, narrow-lanceolate, with a long and slender, cuspidate point, attenuated and reduplicate at base, flat, older ones 1½ ft. long, 3–4 in. broad; petiole 4–6 ft. long, armed with robust, fuscous prickles: fr. ovate-pyriform, 1½ ft. long. India, Burma, and Malaya. G.C. 1873:1083.

F. Tracy Hubbard.

ZALUZÀNIA (named for the Pole, Adam Zaluziansky von Zaluzian). *Compósitæ*. Hoary-tomentose or scabrous-pubescent shrubs or subshrubs: lvs. alternate, entire, dentate, lobed or many-cut: heads pedicelled, heterogamous, arranged in corymbose leafy panicles: ray-fls. in 1 row, pistillate; disk-fls. perfect and fertile; involucre broadly campanulate; corolla yellow or perhaps white.—About 12 species, Mex. Apparently none in cult.

4024. Leaf of Zamia floridana.

ZALUZIÁNSKYA (after Zaluziansky, as indicated above, who wrote Methodus Herbariæ, Prague, 1592). Including *Nycterínia*. *Scrophulariàceæ*. More or less viscous annual or perennial garden herbs, also grown in the greenhouse.

Leaves, lowest opposite, upper alternate, usually few-toothed; floral lvs. smaller, bract-like, entire: fls. sessile, usually arranged in dense or interrupted terminal spikes; calyx ovate-tubular, shortly 5-toothed, 2-lipped or 2-parted; corolla persistent, tube elongated, finally split to the base; limb 5-lobed, entire or 2-cleft; stamens usually 4: caps. oblong, leathery or membranaceous, septicidally dehiscent.—About 36 species, natives of S. Afr. All the species mentioned here have their corolla lobes bifid.

Three of the species are known as night balsams or star balsams, from their night-blooming habit. The name night-blooming phlox would be better, as the flowers are salver-shaped and five-lobed, each lobe being deeply cut. These plants are generally treated as half-hardy annuals, the seed being sown indoors in early spring. The plants bloom in about ten weeks after being set out and continue in flower through July and August. Some cultivators declare that this method is very unsatisfactory and urge that the seed be sown in the autumn and the young plants wintered in a coldframe. They will then begin to flower by June. The blossoms are closed by day and are fragrant by night.

A. *Corolla-tube slightly pubescent.*

B. *Duration perennial: bracts broadly lanceolate: lvs. oblong-linear.*

lychnídea, Walp. (*Nycterínia lychnídea*, D. Don. *Erinus lychnídea*, Linn. *E. grácilis*, Lehm., not Hort.). Subshrub, about 2 ft. high: lvs. oblong-linear, sessile, entire or few-toothed: corolla-tube 1–1½ in. long, limb ½–¾in. across, white inside, purplish or red outside. B.M. 2504; 8215 (the latter as *Z. maritima*). B.R. 748. G.C. III. 42:162 (as *Z. maritima*).—Usually acts much like an annual and is generally treated as such when cult.

BB. *Duration annual: bracts oblong-lanceolate: lvs. linear or the lower ones lanceolate.*

capénsis, Walp. (*Nycterínia capénsis*, Benth.). Differs from the above, as described by Bentham, in stature, duration, strict sts. and smaller lvs., but unfortunately Bentham does not give the height of the plant or color of the fls. According to R.H. 1851:221, the plant has white or lilac fl.-clusters on the same plant, each fl. having an orange eye. The spikes, according to Bentham, are commonly short and 4–8-fld., sometimes long and 15–20-fld. There is some evidence that this species and the next are confused in the trade. In R.H. 1851:221 the fls. are ¾–1 in. long and less than ½in. across.

AA. *Corolla-tube glabrous.*

selaginoides, Walp. (*Nycterínia selaginoides*, Benth.). Dwarf annual, branched at the base, 3–5 in. high, rarely 6 in., with spatulate lvs. and fls. ¾–1 in. long, color of fls. not stated by Bentham, but in R.H. 1896, p. 308 (same picture as Gn. 24, p. 89) the fls. are said to range from white to lilac and darker depending on their stage of development, with an orange-colored eye which becomes crimson later. This suggests the preceding species, and it is evident that the two must be distinguished by technical characters until the colors can be verified. G.C. III. 55:173.—The plant once advertised in America as *Nycterinia selaginoides* is said to be a pink-fld. half-hardy perennial, growing 9 in. high, which does not agree with authentic descriptions. A species passing under this name is hardy at San Francisco.

Wilhelm Miller.
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ZÀMIA (name used by Pliny, meaning *loss* or *damage*, and first applied to barren pine cones, and transferred to these plants apparently because of the cone-like fruit). *Cycadàceæ*. Perennial, tropical and subtropical plants, resembling palms and in some respects ferns.

Caudex sometimes a low trunk, simply lobed or branched, standing above or almost below ground: lvs. few, developing one after the other, pinnately compound; pinnæ broad or narrow, articulate at base, entire or serrate, parallel-veined; petiole smooth or spinulose: cones rather small for the order, glabrous or rarely scurfy: fls. dicœcious, male cone oblong-cylindrical, female cone similar but larger and thicker: ovules sessile, ovoid.—About 36 species, Trop. and Subtrop. Amer. One of the 9 genera of the Cycas family, as constituted by Alphonse De Candolle (Prodr. 16, pt. 2, pp. 522–47). Other genera of horticultural interest and discussed in this Cyclopedia are Ceratozamia, Cycas, Dioon, Encephalartos, and Macrozamia. The fls. of cycads are dicœcious, without envelopes; the pistillate fls. are mere naked ovules inserted under scales in cones, and the staminate fls. are simple anthers under similar scales. The plants are therefore gymnosperms (seeds naked or not inclosed in a pericarp or ripened ovary) and are allied to the conifers. The fr. is a berry-like drupe. In Zamia the floral scales are peltate (and not horned) and form a cylindrical cone; the anthers are numerous, and the ovules pendulous in pairs. The fecundation of Zamia has been studied by H. J. Webber (Bull. No. 2, Bur. Pl. Ind., U. S. Dept. Agric.). His conclusions respecting the Floridian species are accepted below.

4025. Staminate cone of Zamia floridana.

The zamias are stocky short- and usually simple-stemmed cycas-like plants, the trunk sometimes subterranean, with long-pinnate evergreen leaves or fronds, the leaflets being thickened and usually broadened at the base, and jointed. Zamias are warmhouse plants, to be treated like species of Cycas or Encephalartos, which see. The plants are propagated by means of seeds and offsets; also by division when there is more than one crown.

A. *Petiole prickly.*

furfurà̀cea, Ait. Trunk cylindrical, 1–2 ft. tall: petioles dilated and concave at the base, with several small prickles; lfts. about 10–12 pairs, opposite or alternate, oblanceolate, entire on the lower half but serrate or jagged toward the top, acute or obtuse, scurfy beneath (as also the rachis): cone oval-conical, downy, pedunculate, pale yellowish brown, the pistillate ones 4 in. or less long. Mex. B.M. 1969.

Líndenii, Regel. Trunk cylindrical, 2–4 ft. or more tall when well grown: petioles long, cylindrical, sparsely provided with tawny wool, the prickles short-conical and spreading; lfts. 20 or more pairs, glabrous or somewhat puberulous, nearly or quite opposite, sessile, long-lanceolate and acuminate, dentate-serrate toward the top. Ecuador. I.H. 22:195.

AA. *Petiole not prickly.*

B. *Species growing beyond the limits of the U. S.*

integrifò̀lia, Ait. Trunk 12–18 in. tall, erect, globular or oblong: lvs. glabrous; lfts. alternate, 7–16 pairs, oblong to linear-lanceolate to lanceolate, mostly obtuse, entire or somewhat dentate toward the apex: cones oblong and obtuse, short-peduncled. W. Indies. B.M. 1851.—The Fla. plants, sometimes referred here, are apparently all *Z. floridana* and *Z. pumila*.

4026. Pistillate cone of Zamia floridana.

mexicà̀na, Miq. Distinguished by DeCandolle as follows: scales of the lf.-buds tomentose and also the petioles at the base, the petioles 3-cornered, unarmed, glabrous, somewhat warty: lfts. of 9 or more pairs, subopposite, narrow-lanceolate, straight or slightly curved, acute or acutish, rigidly coriaceous, dark green, many-nerved, spinulose-serrulate from the middle to the apex. Mex.—By Index Kewensis referred to *Z. Loddigesii*, a species with prickly petioles.

pseûdo-parasítica, Yates (*Z. Roèzlii*, Regel). Distinguished as follows by DeCandolle: trunk cylindrical: lfts. lanceolate, sinuose-falcate, entire, glabrous, acute at the base, cuspidate at the apex, with 18 strong nerves which are twice bifurcate. Panama.—Grows on tree trunks.

angustifò̀lia, Jacq. Foliage glabrous when mature; lfts. 5 in. long, 4–20 pairs, usually alternate, elongated and narrowly linear, the apex obtuse and very obscurely serrulate or entire, the base not narrowed, 6–8-nerved: pistillate cone obtuse but cuspidate. Bahamas, Cuba.

4027. Aggregate fruit of Zamia floridana. Cone not mature. (×⅓)

BB. *Species native to Fla.*

floridà̀na, DC. Coontie. Comptie. Figs. 4024–4027. Lvs. ovate or ovate-lanceolate; petiole triangular in outline, sericeo-tomentose at base, with scattered hairs above; lfts. mostly opposite, 14–20 pairs, glabrous above and with scattered hairs beneath, linear, falcate and somewhat twisted, narrowed at the base and obtuse at the apex, the margin revolute and with a few obscure teeth: mature pistillate cones oblong, 5–6 in. (12–16½ cm.) long, markedly umbonate (projection on the scales), densely tomentose.—Abundant in S. Fla. on the east coast below latitude 26° 30′, in open comparatively dry pine woods.

pûmila, Linn. Differs, according to Webber, in having shorter and broader lfts. which are less twisted and not so erect and rigid, and in its shorter and non-umbonate cones with seed-bearing scales thinner and more flattened at outer end.—Abundant in Cent. Fla., ranging from 28° 30′ north for 1° of latitude, in dense moist woods.

Z. corállipes, Versch., is Macrozamia spiralis.—*Z. Dénisoni*, Auth., is Macrozamia Peroffskyana.—*Z. glaùca*, Hort.=Cycas Rumphii(?).—*Z. púngens*, Ait.=Encephalartos pungens.—*Z. spinòsa*, Lodd.=Encephalartos Altensteinii.

L. H. B.

ZAMIOCÚLCAS (*Zamia* and *Culcas*). *Aràceæ*. One species, sometimes grown in the warmhouse for ornament and curiosity, it being one of the very few aroids with pinnate lvs. **Z. zamiifò̀lia,** Engler (*Z. Loddigèsii*, Schott. *Calàdium zamiæfò̀lium*, Lodd.), grows in Trop. Afr. It is an evergreen perennial herb, with stout creeping rootstock, and erect glabrous radical lvs. standing 1½–2 ft. high: lfts. about 12, opposite or alternate, oblanceolate, acute, jointed to the petiole and forming small tubers at the base after falling: spathe convolute at base with spreading or reflexed blade, green, glabrous; spadix club-shaped, with female fls. below and male fls. on the longer upward part, whitish, about 1–1½ in. long and ½in. thick. B.M. 5985. L.B.C. 15:1408. Prop. by the lf.-tubers and by division.

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ZANNICHÉLLIA (named in honor of G. G. Zannichelli, a Venetian botanist). *Naiadàceæ.* HORNED PONDWEED. Slender branching herbs, growing under water, of little horticultural value for ponds: lvs. mostly opposite, long and linear, thread-like, entire; stipules membranous, sheathing: fls. monœcious, sessile, naked, usually both kinds from the same axil. About 5 species, scattered throughout the world. **Z. palústris,** Linn. Style at least half as long as the fr., which is flattish, somewhat incurved, even, or occasionally more or less toothed on the back (not wing-margined), nearly sessile. Cosmopolitan in fresh or brackish water.

ZANÒNIA (Jacob Zanoni, 1615–1682, botanist of Bologna). *Cucurbitàceæ.* Under this genus, one species, *Z. sarcophýlla*, Wall., is sometimes listed among cult. plants. This plant is now placed in the genus *Alsomìtra* and becomes *A. sarcophýlla*, Hook. f. It is native of Burma: climbing shrub with very fleshy 3-foliolate lvs.; lfts. oblong, entire: fls. small, white, dicœcious, in compound panicles; corolla rotate, 5-parted, with obtuse segms.; calyx rotate and 5-parted, with acute segms.; male fls. with 5 stamens; females with a 1-celled elongate 3–4-styled ovary: fr. a medium-sized 3-valved caps.; seeds black, narrowed at base, with 2 flat curved horns at apex.

ZANTEDÉSCHIA (Francesco Zantedeschi, wrote on Italian plants in 1825). Syn., *Richárdia. Aràceæ.* CALLA of horticulturists. Perennial herbs grown for their ornamental corolla-like spathes and sometimes for spotted foliage; greenhouse subjects in the northern regions, but grown permanently in the open in California and other warm parts. The genus comprises the "calla lily."

Herbaceous plants with many long-petioled lvs., all from a thick rhizome: peduncles appearing with the lvs.: petioles spongy, often bristly below; blade sagittate, hastate, or lanceolate to cordate-ovate, the numerous primary and secondary nerves excurrent: peduncle as long or longer than the lvs.; spathe large, open, with a flaring, pointed, recurved tip; spadix staminate above, and pistillate below (Fig. 4029): fls. many and small, naked, crowded, staminodes sometimes mixed with the ovaries: fr. a 1–3-celled berry.—Engler admits 8 species in his latest monograph (Das Pflanzenreich, hft. 64, 1915), in Trop. and S. Afr. The common calla-lily was long known in commerce as *Calla æthiopica.* Later it was known as *Richardia africana*, it having been found that the genus Calla, as more closely defined, could not include it. The Richardia of Kunth, 1818, under which the plant has been named, is antedated by another Richardia, and Zantedeschia, 1826, is considered by latest authorities to be the tenable name and is retained in the "nomina conservanda" of the International Rules as against both Richardia and Aroides. The genus Calla, as understood by modern botanists, comprises a single species, *C. palustris*, native in swamps in the northern hemisphere, including N. E. U. S. and Canada; see Fig. 742, Vol. II. For the black calla, see *Arum.*

When grown for the flowers only, zantedeschias may be planted out permanently on a bench, using very rich soil and giving an abundance of water while growing. They may be kept growing continually or given a season of rest, as desired. Plants in pots are usually started late in summer from dry tubers. The species having yellow and pink spathes seem to do best when grown without a resting-period.

Culture of callas. (T. D. Hatfield.)

The so-called calla of gardens (*Zantedeschia æthiopica*) has been a favorite for generations. Although often grown as a window-plant, it is very unsuitable and seldom blooms under house treatment.. When grown for winter flowers, it is customary to give the roots a rest during summer-time. They may be dried and stored if necessary. It is in this condition that Californian callas are received. It is the opinion of the writer that summer-resting would be the best treatment for those grown as house-plants, as well-grown dried roots are more likely to bloom. But rest must be enforced, for callas will grow all the year round, increasing in size and numbers when planted out. The largest blooms are always secured from summer-grown plants. They are taken up in the autumn, given good loam and plenty of root-room, with a liberal allowance of liquid fertilizer when well established. They thrive best under good light, and in a minimum temperature of 55°.

4028. Zantedeschia albo-maculata. (×⅓)

There are several varieties, all differing only in size, from those which grow 6 feet to "Little Gem"—1 foot. Some are said to be more odorous than others, although all are fragrant. Besides being invaluable pot-plants, they can be used with good effect in indoor water-gardens, growing luxuriantly when partly submerged; and also in bog-gardens, and on the margins of ponds, to give sub-tropical effects.

Although introduced to cultivation about twenty-five years ago, *Z. Elliottiana* is yet of secondary importance, although an acquisition. It is a South African species, about which comparatively little is known in the wild. (N. E. Brown writes in "Flora of Tropical Africa," Vol. 8, 1902: "This species is stated to have been raised from seeds received from South Africa, but I have reason to believe that its habitat is somewhere in the northern part of the Transvaal." The plant was described as *Richardia Elliottiana* in Garden and Forest, New York, 1892.) When introduced, it was thought difficult to grow. It was first grown in this country by William Robinson, gardener to F. L. Ames, North Easton, Massachusetts, Mr. Harris, gardener to H. H. Hunnewell, Wellesley, Massachusetts, and Joseph Tailby, of Wellesley. The last named is a commercial grower, who looked on his importation as an investment. The bulbs (corms or roots) were expensive—a guinea or thereabouts—and about as big as marbles. Tailby's experience is interesting and it may be valuable to the reader. He came near losing his whole stock by cutting out the eyes, with the object of getting separate plants. There had been no sign of natural division, nor has there since; although some are still of the opinion that by proper manipulation they may be increased by division, as we now do potatoes, but the wounds must be given time to heal over. The roots are kept over in a cellar at a temperature of 45° F., or thereabouts, until

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April, when they will show signs of starting. They should be potted then, but kept rather dry until the roots develop. The pots will be fairly well filled with roots before much growth shows, and they can be kept under benches in a coolhouse, or even in the cellar, for two weeks after potting. With the roots well started, they come along quickly, coming into bloom in ten to twelve weeks. A good bright intermediate house suits them best, and some liquid fertilizer will help them when the flower-stems appear. The blooms last a long time, opening greenish yellow, turning to pure orange-yellow, and finally green when aging. Seeds are formed plentifully; and by these, though slow, is yet the surest and quickest method of propagation. During the ripening period of seeds, they must have the very best attention. They usually do not become thoroughly ripened until August. Pot-grown plants are better stored in pots. The whole culture is easy when it is known.

4029. Common calla lily.—Zantedeschia æthiopica. Left-hand specimen shows the spadix, the spathe being removed. (×⅓)

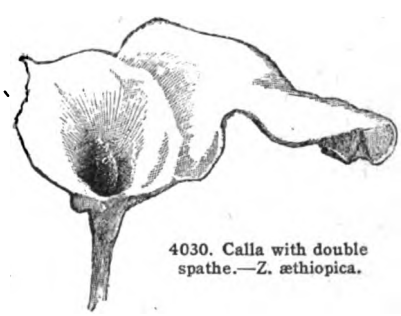
Seeds of *Z. Elliottiana* sown in November usually come up strong, but the plantlets are difficult to handle and liable to go off when very young. It is the safest way to let them stay in the seed-boxes, ripen there, and plant them farther apart next season. Seeds have been sown outdoors with very gratifying results. Almost a year is gained in this way, as the roots (or bulbs) are considerably larger than box-grown seedlings. Older roots held over until settled weather and planted like potatoes bloomed freely all summer, making fine roots; they were green when cut by frost in October, but ripened seeds. To do this successfully takes a longer season, and the plants must be started indoors.

The calla in California. (Ernest Braunton.)

In considering the calla in California, it is necessary to treat it under two general heads: first, as an ornament; and second, as an article of commerce. The popular and growing demand for calla bulbs (or tubers) speaks much for the plant as an ornamental. Many, indeed, are the uses to which it is put. It is, perhaps, most commonly used as a belt along fences, and not infrequently as a hedge between two properties; or nearly as often is found along one side of a house in a long narrow bed. For effective planting it is much in demand for grouping around hydrants and unsightly objects in damp places, at watersides; sometimes as a border around a fish- or lily-pond, oftentimes growing in bunches or masses in the water itself; or massed on a slope near water; mixed with other tropical vegetation; or as a border to tropical jungles; and very effective, indeed, is it in the lower tiers of basins around a large fountain with myriophyllum hanging down from the base of the callas. For all of these purposes the foliage is of even more importance than the flowers. As it grows luxuriantly here in almost any location, it is very seldom seen as a pot-plant either in the dwelling or on sale at the nurseries. In the most favored places only is it entirely secure from the frost, although the damage to it from this source is not serious in or around Los Angeles. Although doing fairly well in the full sun, our summer climate is too dry for it to attain its greatest beauty and luxuriance wholly without protection, and it may therefore be seen in perfection only when grown in partial shade. A good supply of water and manure is also an important factor in its proper development.

The spathe is subject to many variations in form, both in size and shape, some being long, rather narrow and pointed, ending in a decidedly recurved awn, while others are nearly circular, with the sharp point almost wanting and standing upright the same as the remainder of spathe. It frequently happens that the spathe is double and even triple, sometimes in its entirety but often only partially so. In the latter case it often assumes some very strange forms. The spadix is not so variable and seldom departs from the type, although an occasional double or abnormal spadix is found. Most other species or varieties than *Z. æthiopica* are found but sparsely in California gardens, the most common ones being the spotted-leaved and the dwarf form known as the Little Gem, but *Z. Elliottiana* is grown extensively in certain areas, especially about Santa Cruz, which is the center of the bulb-growing industry in California.

Commercially, the growing of the bulbs for eastern and foreign markets is a sure source of revenue, and is conducted extensively throughout southern California. The local market for the so-called flowers is of course limited, but if grown in a practically frostless belt, the blooms will more than pay for the cultivation of the winter field, as in that season of the year flowers of all kinds are scarce. The average retail price for good blooms in midwinter is 50 cents a dozen; the wholesale price about $1 a 100. Bulbs at retail cost about one-half, or even less, what they do in the East. The commercial growers get at present (January, 1916), $25 to $60 a 1,000, according to size, the market calling for tubers 1½ to 3 inches in diameter. Larger sizes are quoted as "fancy" and command extra prices. Although they can be grown in almost any soil with some success, a free cool blackish loam is best, and they do not thrive in a hot gravelly or stony soil. The lands near the coast, where swept by the cooling sea-breeze, are productive of the best results, both in bloom and tuber. Land containing sufficient alkali to prevent the growth of many common crops will produce good callas if other requirements are present. In field-planting it is much better to put in small bulbs about 4 inches apart than to sow the offsets promiscuously in the row; when the sets are thus sown, they should be taken up the following year and the small bulbs properly planted. Offsets sown as above and left four to six years (the usual time for a good crop) have never produced satisfactory results. No pest seriously attacks foliage or bloom, but in dry years more especially, the common sow-bug eats into the tubers very seriously and receives considerable assistance from millipedes. Both these pests are a considerable nuisance to the California nurseryman and gardener.



4030. Calla with double spathe.—Z. æthiopica.

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A. *Lvs. lanceolate.*

1. **Rehmannii,** Engler (*Richardia Rehmannii*, N. E. Br.). PINK or ROSE CALLA. Dwarf perennial: lvs. lanceolate to long-lanceolate, unequal-sided, light green and white-pellucid-dotted, petioled, equaling or exceeding the peduncle and spathe, the petiole without bristles: spathes about 4 in. long, erect, trumpet-shaped, with a caudate tip 1 in. long: fr. an obovoid or depressed obtuse 1-2-celled berry. B.M. 7436.—In Natal, where it is native, the spathes are said to be dull rose without, rose-purple within, with a dark crimson blotch at the base inside. In cult. the spathes are white, with a faint rose tinge to the back and margins. Var. **speciosa,** Hort., is dwarfer and more robust than the type.

AA. *Lvs. sagittate or cordate.*

B. *Foliage spotted.*

2. **albo-maculata,** Baill. (*Richardia albo-maculata*, Hook. f.). SPOTTED CALLA. Fig. 4028. Petiole short, without bristles; blade 12–18 in. long, white-spotted all over, hastate, 3–4 times longer than broad, acute, the basal lobes widely spreading, triangular, obtuse or acute, 3–4 in. long: spathe trumpet-shaped, 4–5 in. long, 2 in. wide, dull creamy yellow or milk-white with a blotch of crimson at the base. S. Afr. B.M. 5140. I.H. 7:255. F.S. 21:2258.—Will stand in the open in frosty regions with good protection for the roots. Not of much value except in botanical collections.

3. **Nelsonii,** Hort. Allied to *Z. albo-maculata:* very vigorous and floriferous, reaching 3–4 ft., the scape overtopping the foliage: lvs. sagittate, bright green, sprinkled with pellucid dots or spots, as in *Z. Elliottiana:* spathe scarcely spreading, the limb short, very pale yellow with a purple blotch at the bottom.—Not recognized by monographers, and perhaps a synonym or a form of some other species. In S. Calif. blooms only in summer, after *Z. Elliottiana* is past.

4. **melanoleuca,** Engler (*Richardia melanoleuca*, Hook. f. *R. Sprengeri*, Comes). BLACK-THROATED CALLA. Scape and petioles bristly below: lvs. 6–12 in. long, hastate-ovate-acuminate, the basal lobes obtuse, marked all over with oblong, white, translucent spots: spathe pale straw-colored, widely flaring and open from the base, the margins and cuspidate tip recurving, with an ample black-purple spot at the base within. Natal, 1868. B. M. 5765. Var. **tropicalis,** Engler (*Richardia melanoleuca* var. *tropicalis*, N. E. Br.), of Trop. Afr., differs in larger size and absence of bristles at base of petiole.

4031. Zantedeschia æthiopica var. minor, Little Gem. (×⅙)

5. **Elliottiana,** Engler (*Calla Elliottiana*, Knight. *Richardia Elliottiana*, W. Wats.). GOLDEN CALLA. Lvs. glabrous; petiole 2 ft. or more long, lacking bristles, more or less mottled; blade ovate or orbicular-ovate, cordate at base, obtuse but subulate-pointed at apex, light green, with a few white or translucent spots, with undulate margins, about as large as those of *Z. æthiopica:* spathe a rich lustrous yellow, lasting about two weeks, becoming greenish with age, not purple-blotched, about 6 in. long: berries about ¾in. diam., nearly globose, green: tuber proliferous. Afr., probably in Trop. Transvaal. B.M. 7577. Gn. 46:446. Gn. W. 11: 553. R.H. 1904:136.

BB. *Foliage without spots.*

C. *Base of the lf.-blade cordate.*

6. **æthiopica,** Spreng. (*Calla æthiopica*, Linn. *Colocasia æthiopica*, Spreng. *Richardia æthiopica*, Hort. *R. africana*, Kunth). COMMON CALLA. LILY-OF-THE-NILE. Fig. 4029. Stout robust plant: lvs. smooth, the petiole without bristles; blade about twice as long as wide, broad or narrow but cuspidate at the apex, cordate-sagittate at the base, both lvs. and spathes varying greatly in size: spathe 3–10 in. long, white, creamy inside at the base, flaring outward and narrowing to a cuspidate tip. S. Afr. B.M. 832. Gn. 33:584. Gn.W. 21:73.—Fragrant. Sports with double and triple spathes often occur. A.F. 5:83. Gn. 46, p. 447. See Fig. 4030.

Var. **minor,** Engler (*R. nana compacta*, Hort.). LITTLE GEM. Fig. 4031. Like the type, but only 12–16 in. high: spathes 3–4 in. long. Var. **devoniensis,** Hort. (*R. devoniensis*, Hort.). Dwarf; freer bloomer than Little Gem, and more fragrant.

There are many forms of the calla lily in cult., a number of which have received Latin names. Some of these horticultural names are **candidissima,** spathe large, pure white; **gigantea,** plant very large; **Godefreyana,** dwarf, white; **grandiflora,** spathe large; **Childsiana,** dwarfer and more compact than type and more floriferous.

7. **macrocarpa,** Engler (*Richardia macrocarpa*, W. Wats. *R. Pentlandii*, Whyte. *Calla Pentlandii*, Whyte. *Z. Pentlandii*, Hort.). Erect perennial: lvs. ovate-cordate, acuminate-caudate, with an open sinus, basal lobes rounded; midrib thick: spathe golden yellow, broadly trumpet-shaped, its lower margins convolute one-third, flaring above, the subulate tip abruptly recurved, margins recurved, slightly warty and with a black-purple blotch at the base within. Basutoland, S. Afr. B.M. 7397.—Hooker writes (in B.M. 7397) that "*R. Pentlandii* is much the largest-leaved species, and is the only one with a deeply gamboge yellow spathe within, which is much the largest and broadest of any." First flowered in 1892 by R. Whyte, Pentland House (Lee, England).

CC. *Base of the lf.-blade hastate.*

8. **oculata,** Engler (*Calla oculata*, Lindl. *Richardia hastata*, Hook. f. *Z. hastata*, Engl. *R. Lutwychei*, N. E. Br. *Z. Lutwychei*, Dur. & Schinz.). PRIDE OF THE CONGO. YELLOW CALLA. Petioles 12–18 in. long, usually or always bristly below; blades dull green, hastate-ovate, twice longer than wide, rather flaccid, 8–16 in. long, cuspidate at the apex, basal lobes separated by a narrow sinus or overlapping and very obtuse: spathe cup-shaped, 4–5 in. long (with a tail 1 in. long), greenish yellow, the tip erect, black-purple at the base within, the lateral nerves usually rather prominent above. Cent. and S. Afr. B.M. 5176. Gn. 18:596.

Most of the garden forms have been named under Richardia rather than under Zantedeschia; in the following list R=the former and Z the latter.—*R. Adamii*, Hort. Leichtlin. Strong-growing, with lvs. sagittate, bright green, and somewhat exceeding the scape: spathe short and rather open, creamy white with a black or purple throat. Trop. Afr. Distributed by Max Leichtlin (Germany) in 1898. There are hybrids of this and Z. Elliottiana.—*Z. angustiloba*, Engler (R. angustiloba, Schott. Z. chloroleuca, Engler & Gilg). Lvs. glabrous, without spots, the petiole without bristles; blade hastate, narrow, the basal lobes one-fourth the length of the apical one, 20 in. long, 3 in. wide at the base: peduncle 4–4½ ft. long: spathe about 4 in. long, sulfur-yellow, red inside at base. Angola.—*R. aurata*, Hort., said to be a hybrid of Z. albo-maculata × Z. hastata (oculata): lvs. spotted: spathes large, yellow.—*R. cantabrigiensis*, Lynch=Z. Elliottiana × R. aurata or Z. Rehmannii × Z. Elliottiana.—*R. intermedia*, Hort. Very free-flowering: lf.-stalks bright green, marbled with white and rose: spathe very dark yellow, with small black blotch at the base.—*R. Lathamiana*, Hort.=Z. Elliottiana × Z. albo-maculata.—"*R. suffusa.* A distinct dwarf-habited plant with a creamy white spathe, the base in the inside of a rich violet-purple shade. It is apparently a plant of good constitution." Gn. 55, p. 317, note.—*R. Taylori*, Hort., is Z. Elliottiana × R. aurata.

JARED G. SMITH.
L. H. B.†

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ZANTHORHÌZA (Greek, *yellow root*). Often spelled *Xanthorrhìza*. *Ranunculàceæ*. Shrubby plants cultivated mostly for their handsome foliage, which is much like that of Actæa, and which changes to a beautiful golden color in the autumn.

Leaves pinnate or bipinnate: fls. in drooping racemes or panicles; sepals 5, petal-like, deciduous; petals 5, smaller than the sepals, and 2-lobed; stamens 5–10; carpels 10, sessile, forming only 1-seeded follicles, 1 ovule of each usually not maturing.—One species, E. U. S. from N. Y. to Fla.

4032. Zanthorhiza apiifolia. (×½)

The plants will grow readily in any good soil but usually prefer damp and shady places, although they often thrive in loose sandy soil. Propagated both by seed and root-division in autumn or early spring. The seeds should be sown in a well-prepared seed-bed as the young seedlings are rather delicate. If sown in early autumn they may be given partial shade to advantage. Old plants when divided are easily grown, and for this reason root-division is often preferred. Often not hardy in Massachusetts and extreme northern states.

apiifòlia, L'Her. Shrub Yellow-Root. Fig. 4032. Sts. of bright yellow wood, 1–20 ft. high: roots yellow, sending up suckers in spring: lvs. in clusters from terminal buds; lfts. about 5, cut-toothed or lobed, with wedge-shaped bases and entire sinuses: fls. small, dark or purple. April. Damp and shady places. A.G. 12: 289. Var. **ternàta,** Huth. Lvs. only ternate; lfts. often more deeply lobed, the sinuses entire. Same distribution.

K. C. Davis.

ZANTHÓXYLUM (Greek, *xanthos*, yellow, and *xylon*, wood). Also spelled *Xanthóxylum*. Including *Fagàra*. *Rutàceæ*. Ornamental woody plants chiefly planted for their handsome foliage and for their ornamental fruits.

Deciduous or evergreen shrubs, sometimes sarmentose, or trees, with usually prickly branches; most parts, particularly the frs., emitting a strong aromatic odor when bruised: lvs. alternate, odd-pinnate, 3-foliolate or rarely simple: fls. dicœcious or polygamous, small, in cymes or panicles; sepals, petals, and stamens 3–8, sepals often wanting; pistils 3–5: fr. composed of 1–5 separate small dehiscent caps., each with 1–2 shining black seeds.—The genus contains about 150 species in the tropical and subtropical regions of both hemispheres, and a few in temperate regions. Several species are used medicinally. The wood of some W. Indian species and that of the Australian *Z. brachyacanthum* is considered valuable. The frs. of *Z. piperitum* are used like pepper in Japan.

The zanthoxylums in cultivation are prickly shrubs or rarely small trees with mostly deciduous odd-pinnate, medium-sized or rather small foliage and small greenish or whitish flowers in small, rarely large, axillary or terminal clusters, followed by usually reddish small pods disclosing lustrous black seeds at maturity. *Z. americanum* is the only species which is hardy North, while the species from eastern Asia, as *Z. schinifolium*, *Z. Bungei*, and *Z. alatum* var. *planispinum*, have proved fairly hardy in favorable positions as far north as Massachusetts, the first being the hardiest, but they probably will be perfectly hardy in the Middle Atlantic states. They do not seem to be particular as to the soil, but grow best in a well-drained soil and sunny position. Propagation is by seeds and by suckers or root-cuttings.

A. *Rachis not or very narrowly winged.*

B. *Fls. before the lvs., in axillary fascicles.*

americànum, Mill. (*Z. fraxineum*, Willd. *Z. ramiflòrum*, Michx.). Prickly Ash. Fig. 4033. Shrub or small tree, attaining 25 ft., with prickly branches: lfts. 5–11, opposite, almost sessile, ovate, entire or crenulate, dark green above, lighter and pubescent beneath, 1½–2 in. long: fls. small, greenish, in axillary sessile clusters, appearing shortly before the lvs.: seeds black. Que. to Neb. and Va. B.B. (ed. 2) 2:444.

BB. *Fls. after the lvs., in terminal corymbs.*

C. *Prickles solitary.*

schinifòlium, Sieb. & Zucc. Shrub or small tree, to 20 ft.: lvs. 3–7 in. long, glabrous; lfts. 13–21, elliptic-lanceolate to lanceolate, narrowed into a short stalk, minutely emarginate at the apex, crenate-serrulate, ¾–1½ in. long: fls. minute, with sepals and petals in terminal short-stalked clusters, 2–4 in. across: fr. greenish or brownish. June; fr. in autumn. Japan, Korea. S.I.F. 2:33.—Sometimes cult. under the name of the following; handsomer in foliage and hardier.

4033. Leaf of prickly ash.—Zanthoxylum americanum.

CC. *Prickles in pairs.*

piperìtum, DC. Shrub or small tree; prickles rather slender, ascending: lvs. 2–6 in. long, with puberulous rachis; lfts. 11–19, ovate to oblong-ovate, narrowed into a short stalk, emarginate at the apex, remotely toothed, with conspicuous glands at the base of each tooth, midrib pubescent above, ½–1½ in. long: fls. with simple perianth, in small corymbs ½–1½ in. across, on short lateral branchlets; style slender: fr. reddish, glandular-dotted. Japan, Korea, N. China. June; fr. in Sept. S.I.F. 1:52.—The wood, according to Issa Tanimura, is dense and heavy with deep yellow grain; tree commonly cult. in Japan for ornament, to make utensils, and for food; the seeds and inner bark are cooked or pickled; the fresh lvs. are added to soup; and the dried fr. used on roasted fish as a fragrant pepper.

Búngei, Planch. (*Z. Bungeànum*, Maxim.). Spreading shrub or small tree; prickles stout, flattened, very broad

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at the base: lvs. 3–5 in., rarely to 9 in. long, often with small prickles on the rachis and on the midrib of the lft. above and below; lfts. 7–11, ovate to ovate-oblong, crenately serrulate, glabrous, ½–2 in. long: infl. a corymb or panicle, mostly on short lateral branchlets: fr. reddish. June, July; fr. in Sept., Oct. N. and Cent. China.

4034. Indian corn.—Zea Mays.

AA. *Rachis distinctly winged.*

alàtum, Roxbg. Shrub or small tree, glabrous, with stout spreading prickles in pairs: lvs. 3–8 in. long, with conspicuously winged sometimes prickly rachis; lfts. 5–11, elliptic-ovate to ovate-lanceolate, rarely obovate-oblong, acuminate, finely serrulate or nearly entire, 1½–5 in. long, the terminal one the largest: fls. in short lateral panicles, 1–2½ in. long, from the axils of last year's branches: fr. red, warty. Himalayas. Var. **planispìnum,** Rehd. & Wilson (*Z. planispìnum,* Sieb. & Zucc.). Lfts. 3–5, otherwise like the type. June; fr. in Sept. China, Korea, Japan. S.I.F. 2:34. R.H. 1913, p. 17. G. 35:213.—Only the variety seems to be cult.

Z. ailantholdes, Sieb. & Zucc. Tree, attaining 60 ft.: branches with numerous short prickles: lvs. 1–4 ft. long; lfts. oblong-ovate, glabrous, glaucous beneath, 3–6 in. long: fls. and fr. in terminal corymbs. Japan. This is called by Sargent one of the most beautiful trees of Japan. —*Z. clàva-Hérculis,* Linn. (Z. carolinianum, Lam.). Toothache-Tree. Pepperwood. Small very prickly tree, 30 or occasionally 50 ft.: lfts. 7–17, ovate-lanceolate, pubescent beneath when young, 1–2½ in. long: fls. and fr. in terminal panicles. April, May. S. Va. to Fla. and Texas. S.S. 1:29.—*Z. dissìtum,* Hemsl. Scandent shrub, to 12 ft. or more: rachis usually with hooked prickles; lfts. 6–15, coriaceous, petioled, elliptic to oblong-lanceolate, entire, lustrous above, often prickly beneath, 3–6 in. long: fls. in axillary panicles 2–5 in. long, with sepals and petals; stamens long-exserted: fr. crowded, yellowish brown; seeds over ¼in. long. Cent. and W. China. This and the two following species have been recently intro. from China.—*Z. Piasézkii,* Maxim. Allied to Z. piperitum. Shrub, to 10 ft.: lfts. 7–15, ovate or obovate to oblong, slightly crenulate or nearly entire, quite glabrous, ¼–1 in. long: fls. in small corymbs; style short: fr. warty, reddish. W. China.—*Z. stenophýllum,* Hemsl. Scandent shrub, to 6 ft.: rachis usually with many slender hooked prickles; lfts. 7–13, ovate-oblong to lanceolate, denticulate, glabrous, 1½–3 in. long: fls. in terminal loose corymbs, 2–3 in. across, with petals and sepals; stamens long-exserted: fr. reddish, beaked; seeds ⅛in. long. W. China. Has not proved hardy at the Arnold Arboretum.

Alfred Rehder.

ZAUSCHNÈRIA (named for a professor of natural history at Prague). *Onagràceæ.* Low perennials, some of them subshrubby, few of them used in the flower-garden.

Leaves, the lowest opposite, others alternate: fls. racemose, large, scarlet, fuchsia-like; calyx-tube globose, inflated just above the ovary, then becoming funnel-form, 4-lobed, bearing 8 small scales within; petals 4, obcordate, or deeply cleft; stamens 8: caps. slender-fusiform, obtusely 4-angled, 4-valved, many-seeded.—About 7 species, W. N. Amer.

califórnica, Presl. California Fuchsia. Hummingbird's Trumpet. Balsamea. Half-hardy perennial with the fl. of a fuchsia and the fr. of an epilobium: height ¾–2 ft.: lvs. linear to oblong, ½–1½ in. long, pubescent or tomentose: fls. scarlet or vermilion, the trumpet-shaped calyx 1½ in long; calyx-lobes ovate; petals obcordate, spreading: fr. 4-valved, imperfectly 4-loculed. Calif. P.M. 15:195. F. 1847–8:241. Gn. 31: 28 and p. 29. R.H. 1849:141. Var. **spléndens,** Hort., is perhaps a little more luxuriant plant, otherwise not differing from the type. Var. **latifòlia,** Hook. Often nearly glabrous: lvs. broad-ovate to ovate-lanceolate, markedly feather-veined. B.M. 4493. F.S. 4:404.—Varieties have been made based on linear, lanceolate, or ovate lvs., but they run into one another. The plants also vary from glabrous and pubescent to tomentose. As a bedding-plant it has been occasionally used for novelty effects by European gardeners. To overcome its thin and leggy habit, it is well to set the plants rather close and pinch out the young shoots until compact bushes are secured. The plant is sometimes grown in pots for greenhouse decoration in late autumn. There are said to be forms that vary considerably in hardiness. The plant is hardy in most parts of England

4035. Ear or pistillate spike of maize. The husks are a kind of involucre. Each kernel represents a flower. The "silks" are styles.

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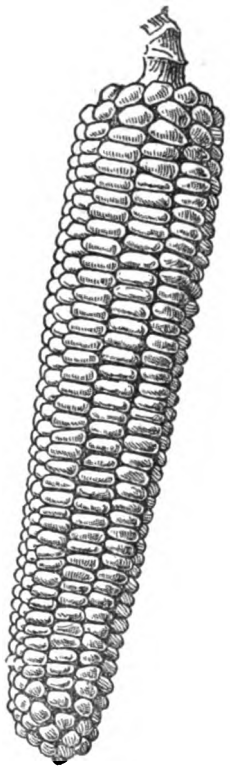
with slight winter covering. In favored spots it is considered to be a choice plant of pendent habit for the steep sides of rockeries and for naturalizing on old walls. In light and dry soils it spreads underground like the epilobiums. It is prop. by division, by cuttings made in autumn and wintered in a coldframe, or by seeds sown in early spring in mild heat. In Calif. the plant is considered objectionable on account of the unkempt appearance produced by the woolly seeds. It is remarkably resistant to drought.

WILHELM MILLER.



4036. Zea Mays.—Flint corn.

ZÈA (an old Greek name for some common cereal, probably spelt). *Gramíneæ.* A large annual grass with monœcious infl., the staminate fls. being in the tassel at the top and the pistillate fls. in one or more ears in the axils of the lvs., each ear inclosed in several reduced lvs. or husks, the numerous styles protruding from the tip as the silk. As now limited the genus is founded on the single polymorphous cult. species, *Zea Mays*, maize or Indian corn (Figs. 4034, 4035, 4036), whose origin is unknown but is suspected by some to be teosinte (*Euchlæna mexicana*). Most of the evidence points to Mex. as the region in which it originated and from which it spread.

After a prolonged study of maize, teosinte, and hybrids between them, Collins advances the hypothesis (Journ. Wash. Acad. Sci. 2:520. 1912) that maize originated as a hybrid between teosinte and an unknown grass belonging in the Andropogoneæ. This grass is thought to have been not unlike the earless varieties of pod or husk corn (*Zea Mays* var. *tunicata*, Figs. 4037, 4038). The chief distinction between pod corn and the ordinary varieties of maize is that the glumes of the pistillate spikelets are developed in pod corn and completely inclose the grain, while in ordinary maize the glumes are reduced to minute scales at the base of the grain. Collins has found that if plants of pod corn are isolated and bred among themselves for a few generations, there will usually result a still greater divergence from the ordinary type of maize. Plants will appear in which the lateral inflorescence or ear is aborted while the terminal inflorescence is greatly enlarged, containing both stamens and pistils. These may be borne either in separate spikelets, in separate florets of the same spikelet, or in perfect florets. Plants of this earless type of pod corn possess no characters which would exclude them from the Andropogoneæ. The constant recurrence of such plants among many varieties of corn Collins considers to be strong indication that some perfect-flowered grass has figured in the ancestry of maize. Harshberger (see G.F. 9:522; Contr. Bot. Lab. Univ. Penn. 2:231) after a study of teosinte-maize hybrids, showed that *Zea canina*, Wats. (Figs. 4039, 4040), originally described as a wild species, is an early-generation hybrid between ordinary maize and teosinte. Harshberger concludes that Indian corn is the result of a cross between teosinte and a race or variety of the same species produced by successive cultivation of the wild plant until its characters as a variety or race have become fixed. Collins holds that this conclusion does not take into consideration the evidence afforded by the podded varieties of maize. To explain maize as a hybrid Collins holds that the second parent must be assumed to be some plant radically different from teosinte, for only such a parent would account for the appearance of characters the very opposite of those which characterize Euchlæna. Under the article *Corn* are given the botanical characters of the genus, a classification of the subspecies, as proposed by Sturtevant, and a discussion of sweet corn and pop-corn.

4037. Pod or husk corn.—Zea Mays var. tunicata. Each kernel inclosed in a husk. (×½)

The following varieties of *Zea Mays* are grown for ornament:

Var. **japónica,** Koern. (*Z. japónica*, Van Houtte. *Z. vittàta*, Hort.). Foliage variously striped with white: plant small: ears small; kernels yellowish, flint. Said to have come from Japan. F.S. 16:1673, 1674. G. 2:463.

Var. **gracíllima,** Koern. (*Z. gracíllima* and *Z. minima*, Hort.). Very dwarf, slender form with green lvs., sometimes cult. in Eu. A var. **variegàta** is also mentioned.

Var. **Curágua,** Alef. (*Z. Curágua*, Molina), is described as a very robust green-lvd. form. Sturtevant places it in the pop-corn tribe. Gn. 42, p. 207.

A. S. HITCHCOCK.

ZEBRÌNA (name refers to the striped leaves). *Commelinàceæ.* One of the species, the wandering Jew, is a very common greenhouse plant, much used for baskets and for covering the ground underneath benches.

Differs from Tradescantia chiefly in the fact that the corolla is tubular (petals not free); stamens 6,

4038. Cross-section of ear of husk corn. (×½)

4039. Zea canina, showing the long branches, with ears at the joints.

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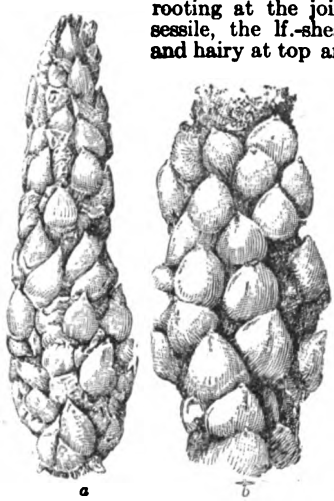
equal; fls. few, sessile, in 2 conduplicate bracts.—Two species, Mex. and Texas.

péndula, Schnizl. (*Tradescántia zebrìna,* Hort. *T. tricolor,* Hort., in part. *Cyanòtis vittàta,* Lindl. *Commelìna zebrìna,* Hort.). WANDERING JEW, in part. Fig. 4041. Trailing, half-succulent, perennial herb rooting at the joints: lvs. lance-ovate, sessile, the lf.-sheath about ½in. long and hairy at top and bottom and sometimes throughout its length; under surface of lf. red-purple; upper surface silvery white, suffused with purplish, the central part and the margins purple-striped: fls. about 2, rose-red, contained in 2 boat-shaped bracts, one of which is much smaller than the other. Mex.—Commonly confused with *Tradescantia fluminensis,* Fig. 3829, and sometimes with *Commelina nudiflora.* See *Tradescantia.* The lvs. of *Z. pendula* seem never to be green. They vary somewhat in color. All forms are easily grown, and they prop. readily from pieces of st. Var. **quadrícolor,** Bailey (forma *quadrícolor,* Voss. *Tradescántia quadrícolor* and *T. multícolor,* Hort.). Lvs. with metallic green undertone and striped with green, red, and white. Handsome.



4040. Ears of Zea canina. *a,* Second year from the wild. Cob flattish. *b,* Third year from the wild. Kernels less pointed. Cob nearly cylindrical. (×⅔)

L. H. B.

ZELKÒVA (after the vernacular name Zelkoua in Crete, or Selkwa in the Caucasus). Syn., *Abelicea,* and including *Hemiptèlea. Ulmàceæ.* Ornamental trees grown for their handsome foliage and attractive habit.

Deciduous: lvs. alternate, short-petioled, penni-nerved, serrate, stipulate: fls. polygamous, the perfect ones solitary in the axils of the upper lvs., the staminate ones clustered in the axils of lower lvs. or bracts; calyx 4–5-lobed; stamens 4–5; styles 2: fr. a 1-seeded drupe, usually broader than high, oblique, with the style eccentric.—Five species in Crete, the Caucasus, and E. Asia. They are closely related to Celtis and Aphananthe and are chiefly distinguished by the connate sepals, the eccentric style and the oblique fr. *Z. serrata* is an important timber tree; the wood is very durable, and considered the best building material in Japan. The young wood is yellowish white in color; the old wood is dark brown and has a beautiful grain.

4041. Zebrina pendula. (×½; fl. enlarged)

The zelkovas are trees, sometimes shrubby, in general appearance much like some of the small-leaved elms, with rather small more or less two-ranked short-stalked leaves, with insignificant greenish flowers appearing at the base of the young branches and followed by inconspicuous fruits. *Z. serrata* and *Z. Davidii* are hardy North, while *Z. ulmoides* is hardy only as far north as Massachusetts, at least only in sheltered positions. *Z. serrata* is a very graceful round-headed tree and well adapted for avenues or as single specimens on the lawn. *Z. Davidii,* which is of recent introduction, may be useful as a hedge-plant on account of its upright rather stiff stems armed with spines. They do not seem to be very particular as to soil and position. Propagation is by seeds sown soon after ripening; also by layers and by grafting on Ulmus.

A. *Fr. not winged: branches not spiny.*

serràta, Makino (*Z. acuminàta,* Planch. *Z. hírta,* Schneid. *Z. Keàki,* Mayr. *Z. cuspidàta,* Hort. *Planèra acuminàta,* Lindl. *Planèra japónica,* Miq. *Planèra Keàkii,* C. Koch. *Úlmus Keàkii,* Sieb.). Fig. 4042.

4042. Zelkova serrata. (×⅛)

Tree, attaining 100 ft., with broad, round-topped head: branches slender: lvs. short-stalked, ovate to oblong-ovate, acuminate, rounded or slightly cordate at the base, sharply and coarsely serrate, with acuminate teeth, pairs of veins about 10, somewhat rough above, almost glabrous, 1–2½ in. long on fertile branches, 2–5 on sterile branches. April, May. Japan. G.F. 6:325. Gt. 37, pp. 22, 23. S.I.F. 1:36. G.W. 16, p. 216.

ulmoides, Schneid. (*Z. crenàta,* Spach. *Z. carpinifòlia,* Koch. *Planèra Richardii,* Michx. *Planèra carpinifòlia,* Wats. *Planèra crenàta,* Desf. *Abelicea ulmoides,* Kuntze). Tree, attaining 80 ft., with slender

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branches forming an oval or oblong head: lvs. oval or ovate to oblong, slightly cordate or rounded at the base, coarsely toothed with obtusish teeth, with 6–8 pairs of veins, usually almost glabrous above at length, pubescent on the veins beneath, ¾–3 in. long. April, May. Caucasus. Gn. 24, p. 371.

4043. Zenobia pulverulenta. (×½)

aa. *Fr. with a small wing on one side: branches usually spiny.*

Dàvidii, Hemsl. (*Z. Davidiàna,* Franch. *Hemipièlea Dàvidii,* Planch.). Shrubby tree, the branches with axillary spines ½–4 in. long: lvs. oval to elliptic or elliptic-oblong, acute, subcordate at the base, with 8–12 pairs of veins on each side, at first with scattered hairs above, each leaving a dark circular depression, and with few scattered hairs on the veins beneath, finally glabrous, ¾–2 in. long: fr. conical, 2-edged, ¼in. long, short-stalked. April, May. N. China, Korea. R.H. 1913, p. 29.

Z. sínica, Schneid. Allied to Z. hirta. Tree, to 50 ft.: lvs. ovate-oblong, rounded or broadly cuneate at the base, firm, crenate-serrate, ¾–2 in. long. Cent. China.—*Z. Verschaffèltii,* Nichols. (Ulmus Verschaffeltii, Hort. Z. japonica Verschaffeltii, Dipp.). Shrub or small tree, allied to Z. ulmoides: lvs. oval or ovate, with 6–9 coarse triangular teeth on each side, rough above, with soft hairs beneath, 1½–2½ in. long. Origin not known, possibly from the Caucasus.

ALFRED REHDER.

ZENÒBIA (after Zenobia, queen of Palmyra, who lived in the third century; a fanciful allusion to her having been chained as was Andromeda, whose name is commemorated by a closely allied genus). *Ericàceæ.* Ornamental shrub grown for its handsome white flowers, and also for the foliage which is covered with a bluish white bloom in one form.

Deciduous or half-evergreen: lvs. alternate, short-petioled, crenulate or entire: fls. in axillary clusters forming terminal racemes on the upper part of last year's branches; calyx 5-lobed, with short valvate lobes; corolla campanulate, as broad as high, obtusely 5-lobed; stamens 10; anthers with 4 slender awns: caps. depressed-globose, obscurely 5-lobed, somewhat carinate at the dorsal sutures, loculicidally 5-valved; seeds numerous, small, oval, angled.—One species in N. Amer., closely allied to Andromeda and Pieris but chiefly distinguished by the open-campanulate fls. and 4-awned anthers.

Zenobia is a low bush with medium-sized short-petioled leaves entire or nearly so and with handsome white nodding flowers in clusters along the upper part of last year's branches. It is hardy as far north as Massachusetts, and a very handsome shrub for borders of shrubberies, particularly when in bloom; the glaucous form is one of the most conspicuous shrubs with light-colored foliage. After flowering, the flower-bearing part of the shoots should be cut off. Zenobia is also recommended for forcing. It thrives best in a sandy or peaty soil. Propagation is by seeds and by layers; also by cuttings of half-ripened wood in July placed in gentle heat, or by greenwood cuttings from forced plants. See, also, *Andromeda* and *Pieris* for culture.

pulverulénta, Pollard (*Z. speciòsa,* Don. *Andrómeda pulverulénta,* Bartram. *A. speciòsa,* Michx. *A. glaùca,* Hort. *A. cándida,* Hort. *A. dealbàta,* Lindl.). Figs. 4043, 4044. Shrub, 2–4 ft. high, with upright or arching branches: quite glabrous: lvs. oval to oblong, obtuse or acutish, crenulate or finely serrulate, often covered more or less with glaucous bloom, 1–2 in. long: fls. on slender nodding pedicels, clustered and forming racemes, 2–5 in. long; corolla white, ⅓in. across. May, June. N. C. to Fla. B.M. 970. L.B.C. 6:551. Gn. 22, p. 271; 24:420; 57, p. 185; 75, p. 212. G.C. III. 23, suppl. May 28. G. 5:299; 6:235; 11:475; 21:179; 28:663. R.B. 31:169. G.M. 31:218; 55:117. Gn.M. 20: suppl. June 20. Var. **nùda,** Rehd. (*Z. cassinifòlia,* Pollard. *Andrómeda cassinifòlia,* Vent. *A. speciòsa* var. *nítida,* Michx. *A. speciòsa* var. *víridis,* Hort.). Lvs. green, without bloom.

ALFRED REHDER.

ZEPHYRÁNTHES (Greek, *flower of the west wind*). Syn. *Atamósco. Amaryllidàceæ.* ZEPHYR FLOWER. FAIRY LILY. Half-hardy tunicate-bulbous herbs, grown in the greenhouse, in window-gardens, and in the garden for summer- and autumn-blooming.

Leaves narrow, usually contemporary with the fls.: peduncle elongated, slender, hollow; spathe membranous, tubular, apex bifid: fls. white, red, or yellow, solitary in the spathe; perianth funnel-shaped, erect or slightly inclined, tube short or elongated, segms. subequal; ovary 3-celled: caps. subglobose, loculicidally 3-valved.—About 53 species, natives of the warmer regions of Amer. A general revision of Zephyranthes is found in Baker's Handbook of the Amaryllideæ, 1888, where the following subgenera are made: Subgenus ZEPHYRANTHES proper. Fl. erect; tube short; stamens inserted near its throat. Subgenus ZEPHYRITES. Fl. slightly inclined; tube short; stamens inserted near its throat; style more declinate than in the other two subgenera. Subgenus PYROLIRION. Fls. erect; tube longer, dilated in the upper half; stamens inserted at the middle of the perianth-tube. For the further separation of the species, Baker uses the characters which appear in the key below, except the foliage-characters and the color of the fls. However, the genus may be readily separated into 3 sections based on the color of the fl., and this arrangement is here used as being more convenient to

4044. Forced plant of Zenobia pulverulenta.

the horticulturist. The seasons of bloom indicated herein are those for localities where the plants will thrive outdoors the year round. For an account of bigeneric hybrids of Zephyranthes and Cooperia, see Lancaster, Journ. Roy. Hort. Soc. 38, p. 531.

The zephyr lilies must be wintered in a place free from frost, and as the best kinds are natives of swampy places it is fair to presume that they will need more

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moisture during the resting-period than the generality of bulbous plants. The best four species are: *Z. candida* (Fig. 4045), white, autumn; *Z. Atamasco*, white, spring; *Z. carinata*, rosy, summer; *Z. rosea*, autumn. All of these will probably survive the winter out-of-doors in the middle states if given a fair degree of protection.

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KEY TO THE SPECIES.

A. *Stamens inserted near the throat of the perianth-tube.*
- B. *Fl. erect.* (*Subgenus Zephyranthes proper.*)
  - C. *Stigma trifid.*
    - D. *Ovary stalked.*
      - E. *Perianth white, often tinged with rose outside.*
        - F. *Length of perianth about 3 in.*
          - G. *Lvs. channeled, bright green, shining, with acute margins* ..... 1. **Atamasco**
          - GG. *Lvs. thick, semi-terete, deep green, not shining, with rounded margins* ..... 2. **Treatiæ**
        - FF. *Length of perianth about 1½–2 in.*
          - G. *Neck of bulb short* ..... 3. **tubispatha**
          - GG. *Neck of bulb about 1 in. long* ..... 4. **erubescens**
      - EE. *Perianth rose-colored or crimson-purple.*
        - F. *The perianth 2½–3 in. long.*
          - G. *Spathe 1½–2 in. long: pedicel shorter than the spathe* ..... 5. **carinata**
          - GG. *Spathe 1 in. or slightly more long: pedicel usually longer than the spathe* ..... 6. **Conzattii**
        - FF. *The perianth 1–2 in. long.*
          - G. *Pedicel about as long as the spathe: spathe 1–1¼ in. long* ..... 7. **Lindleyana**
          - GG. *Pedicel much longer than the spathe: spathe ½–¾ in. long* ..... 8. **rosea**
      - EEE. *Perianth yellow, often reddish outside.*
        - F. *Spathe much longer than the pedicel* ..... 9. **longifolia**
        - FF. *Spathe much shorter than the pedicel* ..... 10. **texana**
    - DD. *Ovary sessile* ..... 11. **verecunda**
  - CC. *Stigma capitate, faintly 3-lobed* ..... 12. **candida**
- BB. *Fls. somewhat inclined; style declinate.* (*Subgenus Zephyrites.*)
  - C. *Perianth yellow inside, coppery red outside* ..... 13. **Andersonii**
  - CC. *Perianth cardinal-red inside and out* ..... 14. **cardinalis**

AA. *Stamens inserted at the middle of the perianth-tube.* (*Subgenus Pyrolirion.*) ..... 15. **aurea**

Subgenus ZEPHYRANTHES Proper.

1. **Atamásco,** Herb. (*Amaryllis Atamásco*, Linn.). ATAMASCO LILY. Fig. 4046. Most popular and largest of the spring-blooming white-fld. species; the commonest zephyr lily native to the U. S.: bulb short-necked, less than 1 in. thick: lvs. 4–6, linear: scape 6–12 in. high: fls. pure white, about 3 in. long. March–June. Va. to Fla. and Ala. B.M. 239. L.B.C. 19:1899. Gn. 24, p. 199:37, p. 155. J.H. III. 63:379.

2. **Trèatiæ,** Wats. Closely allied to *Z. Atamasco* and best distinguished by the lvs. as indicated in the key: perianth-segms. sometimes keeled with rose, but in both species the fls. turn pinkish with age. It is a Fla. species, found in damper localities and blooming several weeks later than *Z. Atamasco*. V. 6:299. Gn. 33, p. 11. G. 10:603. J.H. III. 53:273.

3. **tubispàtha,** Herb. Bulb globose, 1 in. diam.: lvs. narrow-linear, flaccid, bright green, sometimes 1 ft. long: peduncle slender, 6 in. long; spathe 1–1½ in. long, slit at the tip only: perianth 1½–2 in. long, white, slightly tinged with green, never with red, tube scarcely any, segms. obovate. W. Indies, Venezuela, and Colombia.

4. **erubéscens,** Wats. (*Amaryllis erubéscens*, Horsford). Rare white-fld. August-blooming species supposed to be native to sandy plains of Texas, but perhaps from N. Mex.: distinguished from the 2 preceding species by the larger, longer-necked bulb, shorter perianth, and fls. strongly tinged with rose outside: bulb over 1 in. thick; neck as long: spathe bifid above: tube equaling and closely embracing the pedicel (about 1 in. long).—Intro. by Horsford 1889 and probably lost to cult.

5. **carinàta,** Herb. (*Z. grandiflòra*, Lindl.). Largest and choicest of the rosy-fld. species and said by Baker (1888) to be the commonest zephyranthes in cult.; however, the name *Z. rosea* is far commoner in American catalogues: a summer-blooming species with fls. 2½–4½ in. across, and about 3 in. long: bulb 1 in. thick, short-necked: ovary stalked: stigma trifid. Jamaica,

4045. Zephyranthes candida. (×⅓)

Cuba, Mex., Guatemala. B.R. 902. Gn. 33:10 (erroneously as *Z. Atamasco*). I.H. 35:49. J.H. III. 29: 339. G. 21:276; 34:341.

6. **Conzáttii,** Greenm. Bulb globose, about 1 in. diam.: lvs. produced after the fls.: peduncle 6–9 in. high, slender; spathes about 1 in. long: perianth (dried) rose-colored or crimson-purple, tube short, segms. oblanceolate, style declinate. Mex.

7. **Lindleyàna,** Herb. Rare summer-blooming rose-colored species from the mountains of Mex., inferior to *Z. carinata* for general cult.: bulb globose, ¾ in.

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thick; neck short: fls. 1½–2 in. long; ovary stalked; stigma 3-fid; spathe 3-fid only at tip.

8. **rósea,** Lindl. Autumn-blooming rosy-fid. species, with much smaller fls. than *Z. carinata* but, according to American catalogues, the most popular rosy-fid. species: fls. only about 1 in. long and 1½ in. broad: bulb globose, ¾in. thick; neck scarcely any: spathe 2-fid at tip only: ovary stalked: stigma 3-fid. Oct.

4046. Zephyranthes candida above and one Z. Atamasco below.

Cuba. B.M. 2537. B.R. 821. Gn. 12:88.—Trade plants of *Z. rosea* should be compared with *Z. carinata.*

9. **longifólia,** Hemsl. Summer-blooming, yellow-fld. species, distinguished from the next by characters of pedicel and spathe: bulb ovoid; neck 1½–2 in. long: spathe tubular in the lower half: pedicel much shorter than spathe: fls. yellow, coppery outside, ¾–1 in. long. New Mex.—Intro. 1889, and probably lost to cult.

10. **texàna,** Herb. Yellow-fld. Texan species: bulb globose; neck 1–1½ in. long: spathe bifid only at the tip: pedicel much longer than the spathe: fls. yellow, coppery outside, 1 in. long, 1½ in. across. B.M. 3596 (as *Habranthus Andersoni* var. *texanus*). Var. **aùrea,** Hort., with bright yellow fls., is offered in the trade.

11. **verecúnda,** Herb. (*Z. striàta,* Herb.). Rare spring- and summer-blooming species, distinguished from other white-fld. species cult. by the sessile ovary and long-necked bulb: bulb 1 in. or less thick; neck 1–2 in. long: fls. 1½–2 in. long, greenish white, more or less tinged outside or keeled with rose. Highlands of Cent. Mex. B.M. 2583; 2593.—Offered by Dutch dealers.

12. **cándida,** Herb. Figs. 4045, 4046. Most popular of white-fld. zephyr lilies, being distinguished from the others by its autumn-blooming habit and capitate stigma: lvs. appearing in autumn with the fls. and lasting through the winter in favored localities, over 1 ft. long: fls. pure white or slightly tinged rose outside, 1½–2 in. long. Marshes of La Plata. Gn. 37:154; 59, p. 115; 76, p. 551. B.M. 2607. B.R. 724. L.B.C. 15:1419. J.H. III. 43:232. Var. **màjor,** Hort., has fls. 4 in. long, borne on long stout sts. Uruguay.

Subgenus ZEPHYRITES.

13. **Ándersonii,** Baker. Yellow-fld. S. American species of uncertain blooming-time: fls. usually flushed and veined with red outside and there is a variety with copper-colored fls., inside and out: bulb ovoid, short-necked: fls. 1–1½ in. long, 2 in. across. Montevideo, Buenos Ayres. L.B.C. 17:1677 and B.R. 1345 (both as *Habranthus Andersoni*).—Apparently the only representative in cult. of its subgenus, which is characterized by strongly declinate stamens.

14. **cardinàlis,** C. H. Wright. Lvs. ligulate, acuminate, about 6 in. long, above shining green, slightly canaliculate, below keeled: scape cylindrical, rose below, green above; spathe rose: perianth cardinal-red, tube funnel-shaped about 1 in. long, green, segms. broadly oblong-oblanceolate, subobtuse. Amer. B.M. 8553.

Subgenus PYROLIRION.

15. **aùrea,** Baker. Bulb globose, 1½ in. diam.: lvs. about 5, linear, 1 ft. long, ¼in. broad: peduncle 6–12 in. long: spathe membranous, 1½ in. long, cylindrical below: perianth-limb erect, bright yellow, tube funnel-shaped, suddenly dilated at the middle, segms. acute, 1½ x ½in. Peru. G.C. III. 43:405. G. 34:35. G.M. 54:937. Gn. 72, p. 326.

Z. álba, Hort., with pure white fls. is offered in the trade.—*Z. floribúnda,* Hort., is a trade name.—*Z. sulphùrea,* Hort., is offered in the trade.

WILHELM MILLER.
F. TRACY HUBBARD.†

ZÍCHYA: *Kennedya.*

ZÍNGIBER (name ultimately derived from a Sanskrit word meaning *horn-shaped;* probably referring to the ginger root). *Zingiberàceæ.* GINGER. Perennial herbs sometimes grown as warmhouse plants, and also for summer bedding in the southern United States for their decorative value; source of ginger.

Rhizomes horizontal, tuberous: sts. leafy, the flowering and sterile differing: lvs. oblong-lanceolate, clasping the st. by their long sheaths: infl. thyrsoid-spike-like, dense cone-like or rather long, terminal or lateral; bracts usually 1-fid.: calyx cylindrical, shortly 3-lobed; corolla-tube cylindrical, segms. lanceolate, upper concave; later staminodes none or adnate to the obovate-cuneate lip; anther-cells contiguous, crest narrow, as long as the cells; ovary 3-celled, ovules many, superposed: caps. oblong, finally dehiscing.—About 70 species, natives of the tropics of the Old World. Monographed by K. Schumann in Engler's Pflanzenreich, hft. 20 (IV. 46). It is said by gardeners that in Zingiber the leaves tend to roll up or inward and in Hedychium downward.

The ginger plant is a small reed-like plant 2 feet or more high, as cultivated in greenhouses, with tuberous rhizomes, aromatic leaves and dense cone-like clusters of bracts. The flowers, however, are very rarely produced in cultivation, and Roxburgh wrote that he never saw the seeds. The plant is supposed to be native to India and China, but, like many other tropical plants of economic importance, its exact nativity is uncertain. Some idea of the importance of ginger to the world may be gained by the fact that as early as 1884 Great Britain imported 5,600,000 pounds valued at $620,000. Medicinal ginger is prepared from the dried "root;" condimental ginger from the green. Candied ginger is made from carefully selected succulent young rhizomes which are washed and peeled and then preserved in jars of sirup. Housewives often preserve their own ginger; it is important to have the hands protected while scraping the roots or they will "burn" for days. Ginger probably could be cultivated commercially in southern Florida and California. In Florida it thrives in rich soil and partial shade, and the roots can be dug and used at any time. The plant is cultivated commercially even in localities where it is necessary to lift the roots and store them over the cool season, as in the lower Himalayas. In the West Indies ginger may be cultivated up to an altitude of 3,500 feet.

Zingibers are occasionally cultivated as warmhouse

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decorative plants. The shoots having a reed-like appearance, they may often be used to good advantage in arranging plants for artistic effects. They are of the easiest culture. Propagation is effected by division of the rhizomes in spring. These should be potted in fibrous loam to which a third of well-decomposed cow- or sheep-manure has been added. Water should be given sparingly until the shoots have well developed, when they should have an abundance. They are also benefited by an occasional watering with weak liquid manure water. Toward the end of summer the shoots will begin to mature, when the water-supply should be diminished, and as soon as the plants are ripened off the pots may be stored either under the greenhouse stages or in some other convenient place, where they should be kept almost dry for the winter.

4047. Commercial roots of ginger, as seen in the stores. (×⅓)

AA. *Margins of lvs. colored creamy white or often pink.*

Dârceyi, Hort.; also spelled *d'Arceyi* and *d'Arcyi*. About 2–3 ft. high: lvs. lanceolate, 6–8 x 2–2½ in., bright shining green with a broad creamy white or often pink margin and oblique stripes of the same color: fls. deep red, ball-like.—Intro. into Fla. This species is not treated by Schumann and is probably of horticultural origin.

AA. *Margins of lvs. not colored.*

B. *Leafy st. different from the flowering st.: spike from the rhizome.*

Miðga, Roscoe. About 3 ft. high: lvs. moderately or shortly petioled, linear-lanceolate or nearly linear, attenuate-acuminate and caudate at base, both surfaces glabrous, 10–15 x 1–2½ in., membranaceous: spike ellipsoidal, 2–3½ in. long: fls. white; calyx tubular, acuminate; corolla-lobes lanceolate or oblong-lanceolate, lip obovate, entire, basal-lobes yellow; ovary silky: caps. somewhat ovoid, 3-valved. Japan. B.M. 8570.—It is said to be still a saying in Japan that those who eat this plant forget everything, although no one has yet demonstrated it.

BB. *Leafy st. not differing from the flowering st.: spike terminal.*

C. *Bracts green, often pale-margined, rotundate.*

D. *Lvs. grass-like, scarcely ¾in. broad: lip purple, yellow-spotted.*

officinàle, Roscoe. GINGER. Fig. 4047. Sts. normally more than 3 ft. high from a tuberous rhizome: lvs. sessile, lanceolate or linear-lanceolate, attenuate-acuminate at base, up to 8 in. long and scarcely ¾in. broad: spikes ellipsoidal, obtuse, dense, 2 in. long; bracts ovate, pale green, margins often yellow: calyx crenate; corolla yellowish green, lobes lanceolate, acute, lip oblong-ovate, purple, yellow-spotted, lateral lobes ovate, acute. Native of Trop. Asia, but cult. throughout the tropics and intro. into S. Fla. Gn. 26, p. 284.

DD. *Lvs. lanceolate or oblong-lanceolate: lip yellow.*

Zerúmbet, Roscoe. Sts. 12–20 in. high, stout, from a tuberous rhizome: lvs. densely aggregated, oblong-lanceolate, acuminate, base acute, both surfaces glabrous or scattered pilose beneath, 3½–6 x 2–2¾ in.: spike subglobose, dense, 2–3½ in. long; bracts obtuse, pale green, margins pubescent (sometimes, at least when older, red): calyx spathe-like, white; corolla-tube slender, lobes lanceolate, white, lip short, broadly suborbicular or subovate, pale yellow, tinted orange in the center (sometimes red-spotted), lateral lobes short, rotundate. India and Malaya. B.M. 2000.

CC. *Bracts red or at the beginning reddish green, later becoming obscurely red or rose, commonly acute.*

D. *Spike elongated cylindrical, 8 in. or more long, apex obtuse.*

spectábile, Griff. Leafy sts. 6 ft. or more high, robust: lvs. subsessile, oblong-lanceolate, acuminate at base, obscurely green above, paler pubescent beneath, 8–12 x 3½ in.: spike 8–12 in. long, a little over 2 in. diam., laxly cylindrical, apex rounded; bracts yellow, finally scarlet, apex obtuse: corolla yellowish white, dorsal lobe deep concave, broad, anterior narrower, linear-lanceolate, lip obovate, emarginate, 2-lobed, lemon-yellow, apex almost black, lateral lobes half as long as midlobe, ovate. Malay Penins. B.M. 7967.

DD. *Spike 4 in. or less long, elongated, narrow-fusiform, apex acute.*

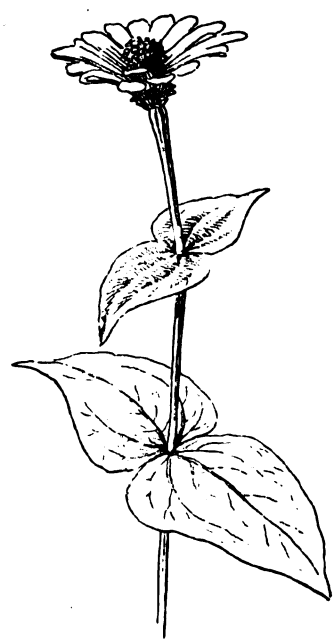
cylíndricum, Moon. Leafy sts. 6 ft. or more high: lvs. sessile, oblong-lanceolate or lanceolate, attenuate-acuminate; base acute, glabrous above, puberulent beneath, up to 8 x 2½ in.: spike 3½ in. long, cylindrical, narrowed at both ends, dense, bracts lower obtuse, upper acute, pale or reddish; corolla-lobes lanceolate, greenish, subequal, greenish, lip yellowish white, lateral lobes small, obtuse. Ceylon.

Z. corállinum, Hance. Leafy sts. differing from the flowering, almost 3 ft. high: lvs. sessile, linear-lanceolate, glabrous above, pilose beneath, 12x 2¼ in.: spike oblong, obtuse, 7 in. long, bracts ovate, scarlet: corolla-lobes red, oblong, acuminate; lip obovate, lateral lobes inconspicuous. China.—Once offered in Fla.

F. TRACY HUBBARD.†

ZÍNNIA (Johann Gottfried Zinn, 1727–1759, professor of medicine at Göttingen). Syn. *Crassina. Compósitæ.* YOUTH-AND-OLD-AGE. Popular flower-garden subjects for summer and autumn bloom, mostly annual or treated as such.

Annual, perennial, and subshrubby plants, mostly Mexican but ranging from Texas and even Colo. to Chile, probably 16–20 species: lvs. opposite, mostly entire: heads terminal, of fls. which are peduncled or sessile: rays pistillate, fertile, disk yellow or purple, its fls. hermaphrodite, fertile; involucre ovate-cylindric or campanulate, the scales in 3 to many series, broad, obtuse or rounded, more or less colored: achenes laterally compressed, 2-toothed at the summit and frequently 1-awned from the inner angle, rarely 2-awned. See the botanical revision by Robinson & Greenman in Proc. Amer. Acad. Arts & Sci. 32: 14 (1897). Illustrated historical sketch in Gn. 48, pp. 464, 465.



4048. Single zinnia.—*Z. elegans.*

The familiar zinnias (Figs. 4048–4050)

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are hardy plants, growing a foot or more high and covered from July until the first hard frost with double flowers 2 inches or more across. Several well-marked colors are commonly seen in zinnias—white, sulfur, yellow, golden yellow, orange, scarlet-orange, scarlet, flesh-color, lilac, rose, magenta, crimson, violet, purple, and dark purple. There are also variegated forms, but the solid colors are most popular. The zinnia is rich in shades of purple and orange, but lacks the blue and pink of the China aster and is poor in reds compared with the dahlia. Three forms or classes of the common zinnia (*Z. elegans*) may be noted here:

I. Tall zinnias are ordinarily 20 to 30 inches high. This size and the next smaller size are the favorites for general purposes. The tall kinds are available in twelve and more colors. A robust race, which attains 28 to 40 inches under perfect conditions, is sometimes known to the trade as *Z. elegans robusta grandiflora plenissima*. It is also known as the Giant or Mammoth strain. This strain was developed after many years by Herr C. Lorenz and was introduced in 1886. A maximum diameter of 6 inches is recorded for flowers of this strain. In G.C. II. 26:461 is shown a flower measuring 4 by 4 inches, with about eighteen series of rays, the latter being so numerous and crowded that the flower is less regular than the common type. A specimen zinnia plant 3 feet high is attained in the North only by starting the seed early and giving perfect culture.

II. Medium-sized zinnias range from 12 to 20 inches in height. They are available in several colors. Here belong most of the forms known to trade catalogues as *Z. pumila*, *Z. nana*, and *Z. compacta*.

III. Dwarf zinnias range from 3 to 12 inches in height and are of two subtypes, the pompons and the Tom Thumbs. The pompons, or "Liliputians," are taller-growing and smaller-flowered, generally about 9 inches high, with a profusion of flowers about 2 inches across. The Tom Thumb type represents the largest possible flower on the smallest possible plant. Both types are available in several colors, not all of which are yet fixed in the seed.

Second in importance to *Z. elegans* is *Z. Haageana*. The single form was introduced to cultivation about 1861 and the double about 1871. It is dwarfer than most zinnias, and has smaller flowers, with a color-range restricted to shades of orange. It is distinct and pretty but less showy than the common zinnias. The first race of hybrids between *Z. Haageana* and *Z. elegans* appeared in 1876 under the name of *Z. Darwinii*. This group is said to resemble *Z. elegans* in size and color of flowers and to recede from *Z. elegans* in habit, being more branched and forming a broader and thicker bush.

Zinnias are of the easiest culture, thriving in any deep good soil, whether loamy or sandy. The seeds may be sown about May 1, or whenever the soil is in fit condition for hardy annuals. Such treatment will give flowers from the first of July until frost. The young plants should be thinned so as to stand 1 to 2 feet apart, depending on whether they are of medium- or tall-growing habit. By midsummer the foliage should obscure the ground. For the very best results the seed may be started indoors about April 1, and the seedlings transplanted once or twice before being placed outdoors in permanent quarters. Dwarf varieties should be set 14 to 16 inches apart: taller kinds 2 feet each way. Zinnias are essentially coarse plants, but if the tall kinds are massed heavily in the borders or at some distance they produce striking and very acceptable effects. Their colors are strong, and the stoutness of stems and foliage add to the composition.

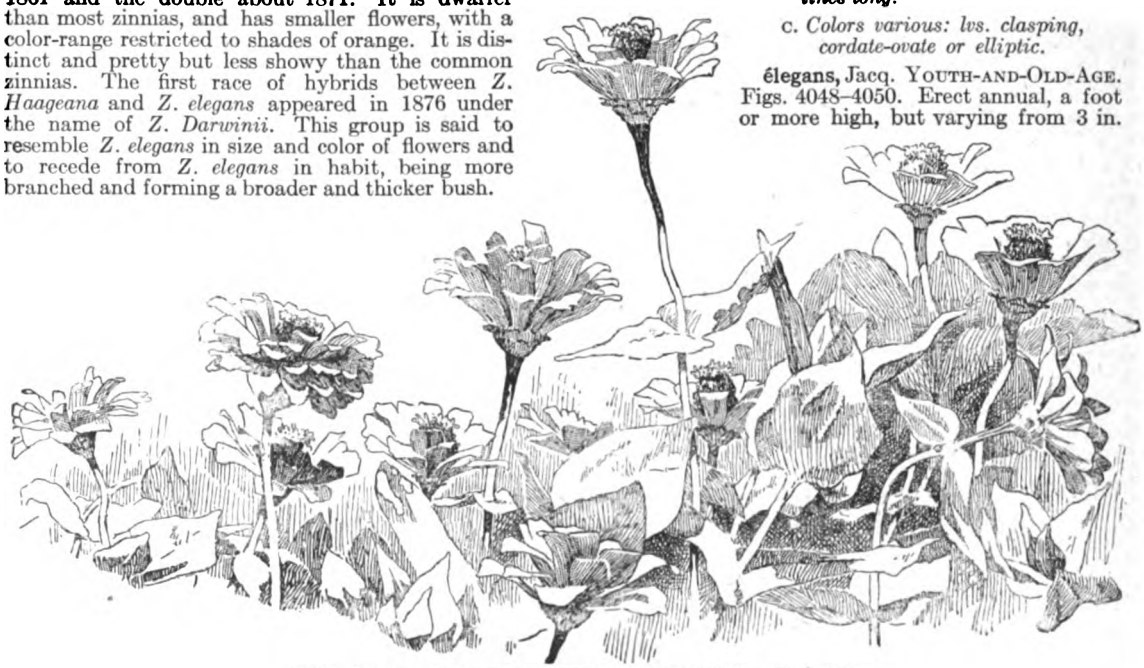
4049. Double zinnias—Z. elegans. (×⅓)

A. *Plant annual.*

B. *Achenes of the disk-fls. short and broad, obovate, 2–2½ lines long.*

C. *Colors various: lvs. clasping, cordate-ovate or elliptic.*

élegans, Jacq. YOUTH-AND-OLD-AGE. Figs. 4048–4050. Erect annual, a foot or more high, but varying from 3 in.



4050. Common garden zinnias, single and semi-double.—Z. elegans.

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to 3 ft.: lvs. ovate or elliptic, clasping, about 1 in. wide: rays becoming reflexed, originally purple or lilac, but now of nearly every color except blue and green; disk originally yellow or orange, but nearly or quite absent in the common double forms: fls. 2–5 in. across. July to Oct. Mex. Single forms are pictured in B.M. 527. P.M. 1:223, B.R. 1294 (the last two as *Z. violacea*). Double forms, F.S. 13:1394, R.H. 1861:251; 1864:331, G. 4:138. Pompons in Gn. 48, p. 464 (Liliput); 30:270 (deceptive as to size), R.B. 20, p. 152.—The common species from which most of the garden zinnias are derived.

cc. *Color orange: lvs. sessile, narrower, lanceolate.*

Haageàna, Regel (*Z. mexicàna*, Hort.). Fig. 4051. Distinguished from *Z. elegans* by the orange-colored fls., which are generally smaller; also the plant is dwarfer, as a rule, and the lvs. are merely sessile, not clasping. Trop. Amer. Single forms, Gn. 30, p. 270; 48, p. 464. Double, Gn. 30, p. 271; 48, p. 464, G. 2:73. F. 1871, p. 229, A.G. 13:218. Var. **stellàta,** Hort. Florets twisted and acuminate, orange-yellow.—This is considered by Robinson & Greenman as a horticultural species not certainly distinguishable from *Z. angustifolia*, in spite of its broader lvs.

bb. *Achenes longer, narrower, oblong, 3–4 lines long.*

c. *Color of rays yellow; disk yellow.*

pauciflòra, Linn. An erect annual: lvs. lanceolate to oblong-ovate, usually rough: heads yellow, about 1 in. across, with rather broad, spreading, red, purple or mostly yellow rays in cult. specimens: plant hirsute, with spreading hairs; somewhat corymbosely branched above: peduncles at maturity enlarged upward and hollow. Mex., Peruvian Andes.

4051. Zinnia Haageana. (×⅓)

cc. *Color of rays red or purple.*

d. *Rays suberect or scarcely spreading; disk yellow.*

multiflòra, Linn. This and the next are included by most writers in *Z. pauciflora*, but *Z. multiflora* may be distinguished from *Z. pauciflora* by the pubescence of the st. being much finer, appressed or rarely spreading, and the rays red or purple, mostly narrow and suberect or scarcely spreading. B.M. 149.

dd. *Rays revolute; disk dark-colored.*

tenuiflòra, Jacq. Fig. 4052. Very distinct by reason of its linear rays which are cardinal-red in color, becoming revolute. It has a dainty fl.-head about 1 in. across hardly comparable with the showy *Z. elegans*. This species has been cult. in Amer. but seems to be no longer advertised here. It is referred to *Z. pauciflora* by most writers, and to *Z. multiflora* by Robinson & Greenman. B.M. 555. A.G. 11:243.

4052. Zinnia tenuiflora. (×⅓)

aa. *Plant perennial.*

grandiflòra, Nutt. Hardy, low-growing, Colo. perennial, with woody root, erect, stiff, and very rough st. having a shrubby base, linear lvs., and sulfur-yellow rays which are very broad, almost round in outline: lvs. less than 1 in. long and 3-nerved. Colo., New Mex., Ariz., Mex.

WILHELM MILLER.

ZIZÀNIA (an old Greek name of some wild grain). *Gramíneæ*. Tall aquatic grasses with lush sts., long blades, and large terminal panicles of monœcious fls.: spikelets 1-fld., the pistillate upper portion of the panicle narrow and appressed, the staminate lower portion spreading; pistillate spikelets long-awned.—Species 3, 2 in N. Amer. and 1 in N. Asia.

palústris, Linn. (*Z. aquática*, of Auth., not Linn.) INDIAN RICE. WATER OATS. WATER RICE. WILD RICE. Fig. 4053. Annual: culms tall, as much as 9 ft.: lvs. broad and flat.—Recommended for borders of lakes and ponds. The grain is excellent for fish and waterfowl. Wild rice lakes and ponds are favorite resorts of sportsmen in the fall. Before sowing, put the seed in coarse cotton bags and sink them in water for 24 hours. Sow in water from 6 in. to 5 ft. deep, with soft mud bottom, or on low marshy places which are covered with water the year round. In running water, sow as much out of the current as possible. Sportsmen are not generally aware that seed can be obtained in large quantities and at a reasonable price from seedsmen. Wild rice is very desirable for aquatic gardens, being one of

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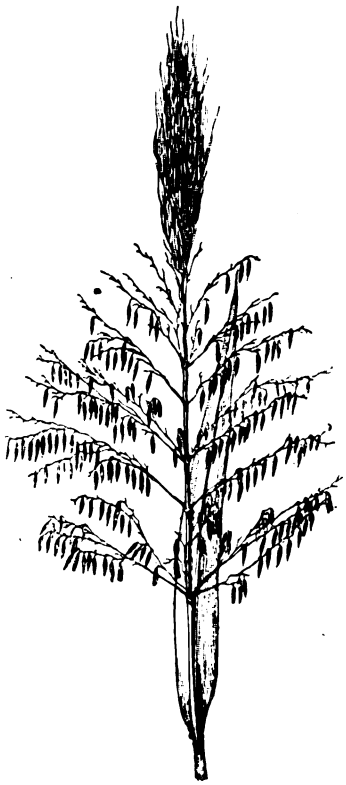
the handsomest of tall hardy grasses for the margins of ponds. C.L.A. 16:40. G. 24:21. Gn. 71, p. 191. See U. S. Dept. Agric. Bur. Pl. Ind. Bull. No. 50, Wild Rice: Its Uses and Propagation; also Recreation 32:149.

A. S. HITCHCOCK.



4053. Zizania palustris.

ZÍZIA (named for I. B. Ziz, a Rhenish botanist). *Umbellíferæ*. Perennial herbs of little horticultural value, but offered by some dealers in native plants.

Leaves ternate or ternately compound or the basal undivided: fls. yellow, in compound umbels, the central fr. of each umbellet sessile; involucre none; involucels of several small bracts; calyx-teeth prominent: fr. ovoid or oblong, glabrous or nearly so, ribs filiform, not winged. —Three species, N. Amer.

A. *Rays of umbels 9–25, stout, ascending.*

aúrea, Koch. GOLDEN ALEXANDERS. Height 1–2½ ft., glabrous and branched: basal and lower lvs. 2–3-ternately compound; upper lvs. ternate: fr. oblong, 2 x 1½ lines. April–June. Fields, meadows, and swamps, New Bruns., Sask. and S. D. to Fla. and Texas.—A weedy-looking plant.

AA. *Rays of umbels 2–12, slender, diverging.*

Bébbii, Brit. Distinguished from *Z. aurea* by the rays and by the fr., which is oval or broader, 1–1¼ lines. May. Mountain woods, Va. and W. Va. to N. C. and Ga.

F. TRACY HUBBARD.†

ZÍZYPHUS (from Zizouf, the Arabian name of *Z. Lotus*). *Rhamnàceæ*. JUJUBE. Ornamental woody plants grown chiefly for their handsome foliage, and some species for their edible fruits.

Deciduous or evergreen shrubs or trees: lvs. alternate, short-petioled, 3–5-nerved from the base, serrate or entire; the stipules mostly transformed into spines, often only one stipule spiny or one a straight and the other a hooked spine: fls. 5-merous; ovary 2–4, usually 2-loculed; style usually 2-parted: fr. a subglobose to oblong drupe.—About 40 species distributed throughout the tropical and subtropical regions of both hemispheres, allied and very similar to Paliurus, but chiefly distinguished by the drupe-like fr. The fr. of *Z. sativa*, *Z. Jujuba*, and *Z. Lotus* are edible, and the first-named is cult. in China.

The jujubes are slender-branched shrubs or small trees with prickly branches, usually 2-ranked, small or medium-sized generally oval or oblong leaves and with small greenish or whitish flowers in axillary cymes followed by drupe-like sometimes edible fruits. They are not much cultivated in this country and none of the species is hardy North; the hardiest seems to be *Z. sativa* but it is tender north of Washington, D. C. Most kinds have handsome foliage and are well adapted for planting in shrubberies in the southern states and California. They seem to thrive in any well-drained soil. Propagation is by seeds, by greenwood cuttings under glass and by root-cuttings.

Jujùba, Lam. Fig. 4054. Tree, 30–50 ft. high: branches usually prickly; young branchlets, petioles and infl. densely rusty tomentose: lvs. broadly oval or ovate to oblong, obtuse, sometimes emarginate, serrate or entire, dark green and glabrous above, tawny or nearly white-tomentose beneath, 1–3 in. long: fls. in short-stalked many-fld. axillary cymes: fr. subglobose to oblong, usually orange-red, ½–¾in. long, on a stalk nearly half its length. March–June. S. Asia, Afr., Austral. Gn. 13, p. 194. S.M. 3:447.—Variable in shape and color of the fr.; for figures of several varieties see Hooker Jour. Bot. 1 (1834):321. The jujube is somewhat planted in Fla. and Calif., although it yet has no commercial rating as a fr.-plant. The frs. or berries are ripe in Nov. and Dec., and the plant begins to bear at 3 years from planting. The jujube fr. is used in confectionery.

sativa, Gaertn. (*Z. vulgàris*, Lam.). COMMON JUJUBE. Shrub or small tree, attaining 30 ft., glabrous: prickly or unarmed; the longer prickle up to 1¼ in. long: branchlets often fascicled, slender and having frequently the appearance of pinnate lvs.: lvs. ovate to ovate-lanceolate, acute or obtuse, oblique at the base, sometimes

4054. Jujube.—*Zizyphus Jujuba.* (× nearly ½)

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emarginate, serrulate, glabrous, ¾–2 in. long: fls. yellowish, fascicled, in axillary cymes: fr. ovoid to oblong, dark red or almost black, ½–¾in. long, short-stalked. March–June. S. Eu., S. and E. Asia; naturalized in Ala. R.H. 1859:602, 603. F.E. 19:395 (pl. 96). Var. **inérmis**, Schneid. (*Z. vulgàris* var. *inérmis*, Bunge). Branches unarmed. A.G. 12:79.

Z. Giráldii, Sprenger. "A fine tree with a slender st. and compact crown and black edible fr." N. China. This is probably not different from Z. sativa, which occurs in N. China and has been collected there by Giraldi according to his herbarium specimens.—*Z. Joazeiro*, Mart. Lvs. broadly ovate, acutish, cordate at base, serrulate, nearly glabrous, 2–3 in. long: cymes many-fld.: fr. cherry-like, yellow. Brazil.—*Z. Lòtus*, Lam. Prickly shrub, 3–4 ft. high: lvs. ovate-oblong, crenulate, glabrous: fls. in few-fld. axillary cymes: fr. subglobose, yellow. S. Eu., N. Afr.—*Z. Místol*, Griseb. Spiny tree, to 30 ft.: lvs. short-petioled, coriaceous, oval, obtuse or retuse, subcordate at base, minutely and sparingly serrulate, hoary pubescent, about 1 in. long: fr. black, ½in. diam. Argentina.—*Z. nummulària*, DC.=Z. rotundifolia.—*Z. oxyphýlla*, Edgew. Closely related to Z. sativa. The slender prickle about ½in. long: lvs. ovate, acute, finely crenate-serrate: fr. elliptic, black, acid, less than ½in. long. Temp. Himalaya. A plant intro. under this name from Arabia by the Dept. of Agric. is said to have sweet frs. of date-like flavor.—*Z. Paliùrus*, Willd.=Paliurus Spina-Christi.—*Z. Párryi*, Torr. Belongs to the genus Condalia, which is easily distinguished by not having spiny stipules but the branchlets transformed into slender thorns and by its entire, usually penni-nerved lvs. *C. Párryi*, Weberb., is a much-branched, glabrous thorny shrub, 4–15 ft. high: lvs. elliptic to obovate, obtuse, cuneate at the base, ⅓–½in. long: fls. slender-pedicelled, in sessile clusters: fr. ovoid, ½in. long. S. Calif. This plant was once offered by a collector of native plants, but it is probably not in the trade now.—*Z. rotundifòlia*, Lam. Shrub, heavily armed: lvs. ovate to orbicular, tomentose on both surfaces: fr. globose, black, woody, about ⅜in. diam. Persia eastward.—*Z. rugòsa*, Lam. Large evergreen shrub or small tree, sometimes of climbing habit, armed: lvs. elliptic, glabrous above, 2–6 in. long: fr. fleshy, 1-seeded, obovoid or globose, ¼–½in. diam. Himalaya.—*Z. Spìna-Christi*, Willd. Small prickly tree: lvs. oval to oblong, crenulate, glabrous or pubescent on the veins beneath: fls. in axillary clusters; pedicels tomentose: fr. ovoid-globose, red. N. Afr., W. Asia. This species is supposed by some to have furnished Christ's crown of thorns; see also Paliurus Spina-Christi.

ALFRED REHDER.

Cultivation of the jujubes.

While several species of Zizyphus bear edible fruits, *Z. Jujuba* is the only one of much importance in cultivation. As to its original country, preponderance of evidence favors Syria, from whence it was carried to Europe by Sextus Popinius toward the end of the reign of Augustus Cæsar, about the beginning of the Christian era, and soon spread to all the countries bordering the shores of the Mediterranean. It is a quite hardy tree but its cultivation in Europe is confined to the warmer parts of Italy, France, Spain, and Portugal, and in Africa to the northern states of that continent. Its first introduction into the United States seems to have been by Robert Chisolm who brought trees from Europe in 1837 and planted them at Beaufort, North Carolina. It was introduced to California and neighboring states from southern France by the writer in 1876. The original trees of this importation are still growing in Sonoma Valley and have reached a height of 25 feet and a diameter of trunk of 8 to 10 inches, and are annually bearing abundant crops of fruit.

The tree is of drooping habit, the branches, especially in autumn, bending down with the burden of fruit. Its delicate light green foliage renders it very ornamental, while its reddish brown shining fruit, the size and shape of a small olive, adds to its beauty in autumn. The fruit is dry and wrinkled when fully ripe and has a subacid flavor which is pleasing to most persons. In southern Europe it is used to a considerable extent as a table dessert and in winter as a dry sweetmeat. It is regarded as a valuable pectoral and is esteemed for throat troubles in the form of pastes, tablets, sirup, and the like.

The tree has been extensively cultivated in northern China for thousands of years and hundreds of varieties have been developed. Frank N. Meyer, an explorer sent out by the Office of Foreign Seed and Plant Introduction of the United States Department of Agriculture, has introduced many of the best varieties, most of which are now fruiting at the Department experiment station, and are being distributed in the least frosty sections of the country. The fruits of the Chinese varieties are much larger than those grown in Europe, but are somewhat inferior in flavor. In China orchards of hundreds of acres in extent were observed by Meyer in the vicinity of the cities. One variety has recently borne at the Introduction Garden at Chico, California, the fruit of which is as large as an average hen's egg. Meyer says there are 300 or 400 varieties in cultivation by the Chinese. Some types are spherical and brown in color, others elongated and light mahogany-brown. Some sorts are eaten fresh and others are dried and keep indefinitely. The largest varieties when processed with sugar and honey make a delicious sweetmeat, comparable to a good quality of Persian dates. The Chinese shops in this country carry stocks of the dried and processed fruits which are much appreciated, not only by the Chinese, but by Europeans. Most of the varieties are armed with sharp stipular thorns, though occasionally thornless and seedless sorts have been produced.

Besides *Zizyphus Jujuba*, which produces the best fruits, other species are useful in various ways. *Z. Joazeiro* of Brazil, according to Dorsett, Popenoe, and Shamel, is a beautiful dense umbrageous tree producing enormous crops of fruit which is greedily eaten by sheep, cattle, horses, and swine, and has the advantage of thriving in very arid regions. *Z. Lotus* grows about the shores of the Mediterranean, the fruit of which, though inferior to *Z. Jujuba*, is eaten by the people of its native country. *Z. rotundifolia* (*Z. nummularia*) is a thorny shrub native of northwestern India where it is much used as a garden hedge. The fruit is small, but of pleasant subacid flavor. *Z. rugosa*, with an edible drupe, is hardier than the last, ascending in Burma to 4,000 feet. *Z. sativa* is a small or medium tree of Syria and northern India, ascending the Himalayas to 6,500 feet, therefore quite hardy. Its fruit is the size of a large olive, acid, but used for pastes and pectoral lozenges. *Z. Spina-Christi* is a bush used for hedges, so named from a notion that the crown of thorns was fashioned from the twigs. *Z. Mistol* is a small tree of Argentina with edible fruit with large stones.

The common jujube thrives in nearly all parts of the southwestern states and California and on all kinds of soil, except heavy clay and in wet locations, and requires little irrigation. The trees are planted 15 to 20 feet apart and are given the usual orchard cultivation. On account of their beauty the trees are often planted in dooryards. Propagation is by seeds or offsets. The seeds are very hard and are often cracked before planting, otherwise they will be one or even two years in germinating. Seedlings have been known to blossom at one year, but four years is more usual. As established trees send up abundant sprouts, the usual method of propagation is by this means.

The trees are regular bearers and the crop is never cut off by spring frosts, as they do not blossom until June in the valleys of California. The fruit of most varieties ripens in October and November and if desired for consumption fresh is gathered when showing the characteristic reddish brown or mahogany color, but if to be dried it is left on the tree until it assumes a darker shade and the skin is wrinkled. In this condition, after a short exposure to the sun the fruit will keep a year or longer. For preserving in sirup or glacéing, the unwrinkled fruit, being slightly more acid, is preferred.

The jujube is well worth the attention of fruit-growers and when produced in sufficient quantities will find an active demand from citizens from the south of Europe. It will appeal to all when fresh from the tree when properly processed, and for its medicinal virtues when simply dried or made into pastes or tablets. G. P. RIXFORD.

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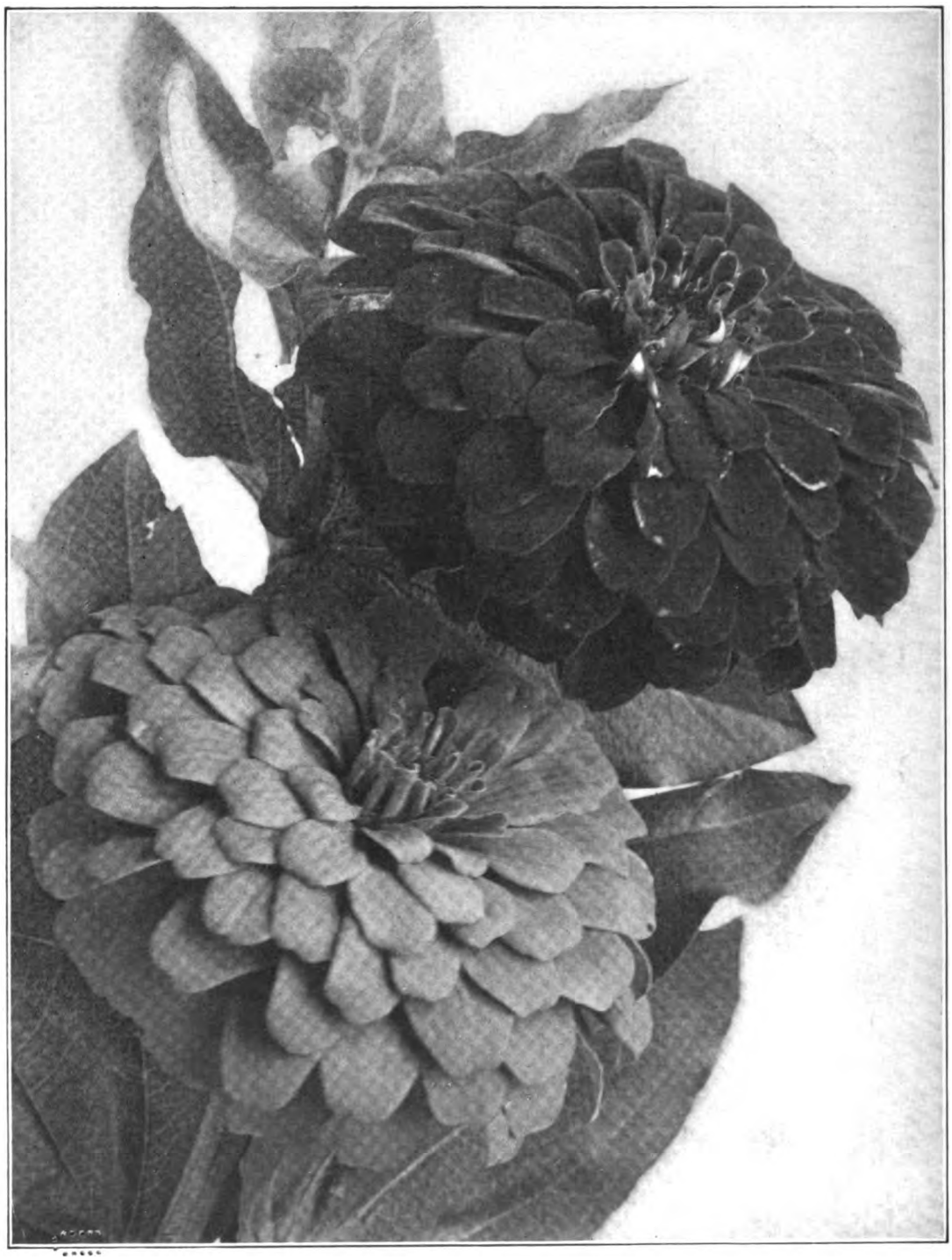

CXX. Zinnia, Giant Yellow and Scarlet.

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ZÒYSIA (after Karl von Zoys, an Austrian botanist). *Gramíneæ*. Low creeping maritime perennials, sometimes used for lawns and putting-greens. Propagated by cuttings of the rhizomes.

Flowers in a close spike-like panicle; spikelets closely appressed, 1-fld., awnless, the single glume coriaceous, acute, compressed, inclosing the lemma and palea.—Species 4. S. E. Asia and Australasia.

japónica, Steud. KOREAN LAWN-GRASS. PALM-BEACH GRASS. Somewhat coarser than *Z. Matrella*, the blades as much as ⅛in. wide, the panicles about 1 in. long, often purplish. A native of Japan and China; intro. many years ago from Korea; now grown in Fla. and is hardy as far north as Conn. Recommended for use on sandy soil from N. C. to Fla. Dept. Agric., Div. Agrost. 20:29.

Matrélla, Merr. (*Z. púngens*, Willd. *Osterdàmia Matrélla*, Kuntze). MANILLA GRASS. Sts. creeping, throwing up numerous short leafy shoots and flowering sts.: lvs. crowded, firm, 1–3 in. long, ending in a sharp hard point; spikes 1–2 in. long; spikelets ⅛in. long, smooth and hard. A native of S. E. Asia, E. Indies.—Grown in Fla. and along the Gulf Coast.

tenuifòlia, Willd. MASCARENE GRASS. VELVET-GRASS. Lvs. thread-like, finer than in the other species. Forms a beautiful turf resembling that of red fescue. Native of the Mascarene Isls. Intro. into the U. S. from Guam in 1912. Used in Calif. where it is called velvet-grass, and along the Gulf Coast.

The name velvet-grass describes it very aptly as it looks like dark green velvet. It grows so thickly that it will smother out any other plant, even Bermuda- or "devil"-grass. Even if frozen off it will come up from roots. It needs little water, no cutting, will run out all other plants, will not become a pest as it sets no seeds in California, and is lovely in appearance. It is so fine that it may be pulled into thousands of pieces to the square foot and every little piece will grow, so that a small quantity will plant a large area. (Ernest Braunton.)

A. S. HITCHCOCK

ZYGÁDENUS (Greek, *yoke* and *gland*, some of the species having two glands in the base of the perianth). *Liliàceæ*. Smooth and somewhat glaucous perennials with non-bulbous rhizomes or with tunicate bulbs; some of the species are grown in pots, others in the open; interesting plants of secondary importance horticulturally.

Leaves radical or gathered at the base of the st., long-linear, those of the st. small and few: raceme terminal, simple or paniculately branched: fls. perfect or polygamous, white, yellowish or greenish; perianth witherings-persistent, spreading, the petal-like oblong or ovate sepals 1–2 glandular near the more or less narrowed but not clawed base; stamens 6, free: caps. 3-celled in fr., the cells separate at the top or for their entire length.—About 25 species have been described, one of which is Siberian, one Japanese, and the remainder from N. Amer. including Mex. The species of Zygadenus are little known in cult. They are sometimes recommended for the wild-garden, where they thrive in wet or boggy places. Increased by division; also rarely by seeds. Some or all of the species have poisonous seeds, bulbs, rhizomes, and foliage, being known as "death camas" (see Bull. No. 125, Professional Paper, U. S. Dept. Agric., May 13, 1915). Monographed by Watson. Proc. Amer. Acad. Arts & Sci. 14:278 (1879), so far as American species were then concerned.

A. *Sts. from a creeping rootstock.*

glabérrimus, Michx. Sts. 1–3 ft. high: lvs. grass-like, channeled, conspicuously nerved, elongated, tapering to a point: panicle pyramidal, many-fld.: fls. perfect; sepals ovate, becoming lance-ovate with a short claw. Va. to Fla. and Ala. B.M. 1703 (as *Helonias bracteata*). L.B.C. 1330. G.W. 6, p. 269.

AA. *Sts. from a more or less bulbous base.*

B. *Locules of the caps. dehiscing to the base: stamens free from perianth-segms.: glands usually 1 or 2 in the base of the perianth. (Zygadenus proper.)*

C. *Glands large, covering nearly the whole base of the perianth-segms.: bulb tunicated.*

D. *Fls. usually perfect, rather large.*

élegans, Pursh (*Z. glaùcus*, Nutt. *Helònias glabérrima*, Ker. *Anticlèa élegans*, Rydb.). Three feet or less tall, the lvs. ½in. or less broad and very glaucous: bracts purplish: fls. greenish, in simple or sparingly branched racemes, the segms. broad and less than ½in. long, coherent to the ovary, the fl. opening about ½in. across. Across the continent from New Bruns. and south to New Mex. B.M. 1680. B.R. 24:67.

Frèmontii, Torr. Lvs. an inch or less broad, less glaucous than the above: bracts green: fls. usually larger, rotate, the segms. free from the ovary. Calif. from San Diego north, in the Coast Range.—One of the "soap plants." Said to be the best of the genus for cult.

Núttallii, Gray (*Toxicoscòrdion Núttallii*, Rydb.). Lvs. from ¼–¾in. wide, scarcely glaucous, light green: bracts scarious: fls. ½in. across, in a simple or branched raceme, the segms. free from the ovary. Kans. to Colo. and Texas.

DD. *Fls. polygamous, small.*

venenòsus, Wats. Slender, 2 ft. or less tall: lvs. very narrow (¼in. or less), scabrous, not glaucous, the st.-lvs. not sheathing: bracts narrow, scarious: fls. in a short simple raceme, the perianth free from the ovary, the segms. ¼in. or less long, triangular-ovate to elliptic, short-clawed. Calif.—Bulb poisonous.

paniculàtus, Wats. Usually stouter, the lvs. broader and sheathing: raceme compound: perianth-segms. deltoid, acute, short-clawed. Sask. to Calif.—Bulb poisonous.

CC. *Glands very obscure: bulb somewhat fibrous, narrow.*

leimanthoìdes, Gray (*Oceanòrus leimanthoìdes*, Small). St. slender and leafy, 4 ft. or less tall: lvs. ⅛in. or less wide, green on both sides: racemes panicled: fls. about ⅓in. across, the segms. oblong, not clawed. N. Y. to Ga.

BB. *Locules dehiscing only above middle: stamens inserted on perianth-segms.: glands none: bulbous. (Amianthium; preferably retained as distinct genus.)*

muscætóxicus, Regel (*Helònias làta*, Ker. *Amiánthium muscætóxicum*, Gray. *Chrospérma muscætóxicum*, Kuntze). FLY-POISON. Slender, 4 ft. or less tall: lvs. rather short, the basal ones varying from ⅛in. to over 1 in. broad, not glaucous: racemes simple: fls. about ⅓in. across, the segms. ovate-oblong and obtuse. N. Y. to Fla. and Ark. B.M. 803; 1540. L.B.C. 10:998. Gn. 57, p. 160.—Bulb and herbage poisonous. A fly-poison has been made from the bulb.

L. H. B.

ZYGOCÁCTUS (cactus with zygomorphic flowers). *Epiphyllum* of horticulturists. *Cactàceæ*. CRAB-CACTUS. This genus is confined to Brazil, so far as known, where the plants grow as epiphytes upon the trees, along with orchids, growing in large clusters on the branches: sts. flat and jointed, becoming rounded with age, bearing areoles only on the margins and more or less truncated ends, from which grow the new branches and the conspicuously zygomorphic fls.; ovary devoid of bracts, and those of the tube comparatively large and colored as the petals. The genus is allied to Epiphyllum (Phyllocactus), with which it was at first united; but it is still more closely connected with Schlumbergera. In cult. many forms have been produced through hybridization between the different species and with Epiphyllum and the allies of Cereus, so that typical plants are rarely met with.

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truncàtus, Schum. (*Epiphýllum truncàtum*, Haw.). Crab Cactus. Christmas Cactus. Fig. 4055. Sts. much branched and hanging in large bunches from the trees; joints obovate to oblong, with strongly truncate apex, 1¼–2 in. long by about ¾–1 in. broad, bright green, margins coarsely serrate, with 1–3 large, acute teeth on each side, the 2 upper ones forming more or less incurved horns on either side of the truncation: areoles bearing a few short yellowish or dark-colored bristles, or sometimes none: fls. horizontal, growing from the truncated end of the younger joints, strongly irregular, 2½–3½ in. long, in various shades of red: fr. pear-shaped, red, about ⅝ in. diam. Brazil. B.M. 2562. G.C. III. 19:9.—Most of the forms in cult. are hybrids between this species and some other of the genus or with allies of Cereus. A common basket- and rafter-plant.

4055. Zygocactus truncatus. (×⅓)

For *Epiphyllum Russellianum* and *E. Gærtneri*, see Schlumbergera.

J. N. Rose.

ZYGOCÒLAX (compounded from *Colax* and *Zygopetalum*). *Orchidàceæ*. Hybrids between the genera Colax and Zygopetalum. *Z. Amesiànus*, Hort. (Z. brachypetalum × C. jugosus). Fls. larger than the latter parent; sepals and petals clear green, heavily marked with dark purple; midlobe of lip heart-shaped, white, with interrupted radiating lines of violet-blue.—*Z. Chárlesworthii*, Hort. (Z. Perrenoudii × C. jugosus). Fls. dark green; sepals and petals closely marked with purplish chocolate; lip violet with a white margin.—*Z. leopardìnus* (Z. maxillare × C. jugosus). Fls. about 2 in. across; sepals and petals whitish, spotted and marked with brown-purple; lip 3-lobed, side lobes indigo-blue, midlobe same color but mottled with white.—*Z. Veìtchii*, Rolfe (Z. crinitum × C. jugosus). Fls. about 3 in. across; sepals and petals light yellow-green, spotted and blotched with brown-purple; lip whitish with radiating lines of violet-purple. B.M. 7980. Gn.W. 20:89. J.H. III. 57:243.—*Z. Wiganiànus*, Hort. (Z. intermedium × C. jugosus). Similar to the former in habit: fls. slightly larger; sepals and petals pale green, barred with light brown; lip white with violet lines. G.M. 43:121. Var. *supérbus*, Hort., has sepals and petals broad and rounded at the tips, heavily barred and marbled with very dark purple; lip flattish, extending horizontally, white heavily marked with violet. G.C. III. 31:156. G.M. 45:142.—*Z. woodlandénse*, Hort. (Z. maxillare var. Gautieri × C. jugosus).

F. Tracy Hubbard.

ZYGONÍSIA (compounded from *Aganisia* and *Zygopetalum*). *Orchidàceæ*. Hybrids between the genera Aganisia and Zygopetalum. *Z. Rolfeàna*, Hort. (Z. maxillare var. Gautieri × A. lepida). In general appearance like the latter parent; its fls. cream-white, blotched with violet. G.C. III. 32:30. F.S.R. 3:176.—*Z. Sánderi*, Hort. (A. lepida × Z. sp.), has cream-white fls. heavily blotched with violet.—These hybrids are not much known.

ZYGOPÉTALUM (name referring to the un flower parts). *Orchidàceæ*. Mostly epiphytic orc of easy culture.

Plants with numerous distichous lvs. sheathin short st. which usually becomes thickened int pseudobulb: lvs. membranaceous, venose or plicate: solitary or in racemes, showy; sepals and petals nea alike in form and color, often united to each other at the base, the lateral sepals forming a mentum with the foot of the column; labellum with the lateral lobes scarcely prominent, middle lobe broad and plane, spreading, or recurved at the apex, with a prominent fleshy crest on the disk; column incurved, wingless or with small wings; pollinia 4, not appendiculate.

The *Z. Mackaii* group grow well under pot culture. One or two species with creeping rhizomes, like *Z. maxillare*, thrive best on sections of tree fern, osmunda rhizome, or in baskets. A good compost consists of equal parts of chopped sod, peat-fiber and sphagnum moss, well mixed and interspersed with pieces of rough charcoal, about one-half of the pot space being devoted to clean drainage material. After distributing the roots, the compost should be worked in carefully but not too firmly about them, leaving the base of the plant even with, or just above, the rim of the pot. Repotting should be done when the plants show new root-action. The temperature should range about 60° F. by night and 65° to 70° by day in winter, and in summer as low as possible, with free ventilation during inclement weather. A cool, light location in the cattleya department is favorable. The compost should be kept in a moist condition at all times. The plants are propagated by cutting through the rhizome between the old pseudobulbs at a good eye, potting up the parts and removing them to a rather higher temperature until they start into new growth. (Robt. M. Gray.)

A. *Anther long-rostrate.*

rostràtum, Hook. Pseudobulbs oblong, compressed: lvs. lanceolate, 5 in. long: scapes 4 in. long, bearing 1–3 fls.: sepals and petals linear-lanceolate, greenish brown, wavy, 2–3 in. long; labellum about as long as the petals, subrotund, with reflexed margins, pure white with few radiating lines near the base; column-wings rounded, sharply serrate on the upper margin; anther with a long beak surmounting the column. May, June, Oct. Guiana. B.M. 2819. J.H. III. 28:7. A.F. 6:633.

AA. *Anther not rostrate.*

B. *Petals spotted or blotched.*

C. *Labellum glabrous.*

Máckaii, Hook. Fig. 4056. Pseudobulbs large, ovate: lvs. many, linear-lanceolate, 1 ft. long: scape 18 in. long, bearing 5 or 6 large fls.: sepals and petals dingy yellowish green, with blotches of purple on the inside, lanceolate, acute, erect, spreading, all united toward the base; labellum large, rounded, emarginate, white with radiating vein-like deep blue lines, glabrous. Brazil. B.M. 2748. B.R. 1433 (as *Eulophia Mackaiana*). P.M. 3:97. L.B.C. 17:1664. J.H. III. 33:295. G.M. 53:1037.—This is distinguished from *Z. intermedium* and *Z. crinitum* by its smooth labellum and narrower lvs. Vars. **supérbum, grandiflórum, màjus** are also advertised. Var. **Chárlesworthii,** Hort. Sepals and petals emerald-green, without purple markings. G.C. III. 51:83.

Gautièri, Lem. Pseudobulbs oblong-sulcate, 4 in. high: scape 2–3-fld.: fls. 3 in. across; sepals and petals green blotched with brown; labellum broadly reniform, deep purple at the base, white in front, sometimes nearly all deep purple with a darker crest. Autumn. Brazil. I.H. 14:535. Gn. 49:118.—The lvs. are fasciculate, narrowly oblong, keeled, 12–16 in. long: infl. shorter than the lvs.

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maxillàre, Lodd. Pseudobulbs 2 in. long: lvs. lanceolate, 1 ft. long: scape 9 in. long, 6–8-fld.: fls. 1½ in. across; sepals and petals ovate-oblong, acute, green, with transverse brown blotches; labellum horizontal, purple, with a very large, glossy purple, notched horseshoe-shaped crest, middle lobe roundish, waved, and obscurely lobed. Winter. Brazil. B.M. 3686. L.B.C. 18:1776. J.H. III. 33:295. P.M. 4:271.—Distinguished by its small fls. and very large crest.

cc. *Labellum pubescent.*

crinìtum, Lodd. Habit of *Z. intermedium:* lvs. broadly linear-lanceolate: fls. on long, stout scapes; sepals and petals 2 in. long, oblong-lanceolate, green with rather few brown blotches; labellum 2 in. across, spreading, wavy, scarcely emarginate, white with purple veins radiating from the thick crest, disk hairy. Fls. at various times. Brazil. L.B.C. 17:1687. B.M. 3402 (as *Z. Mackaii* var. *crinitum*).—This has fewer brown blotches on the sepals and petals than *Z. intermedium.* There are varieties with pink, blue, or almost colorless veins on the labellum. Var. **cærùleum,** Hort., has the veins deep blue. G.M. 46:153; 50:59. J.H. III. 46:197.

intermèdium, Lodd. Lvs. ensiform, 1½ ft. long, 1½ in. wide: scape longer than the lvs., bearing 5–6 fls. each nearly 3 in. across: sepals and petals oblong, acute, green with large, confluent blotches of brown; labellum rotund, narrowed at the base, deeply 2-lobed in front, pubescent, bluish white with radiating broken lines of purplish blue; column green and white. Fls. in winter. Brazil. R.H. 1873:190 (as *Z. Rivieri*).—Plants of *Z. Mackaii* are often cult. under this name.

DD. *Petals uniformly colored.*

Sèdenii Reichb. f. Plants strong, with the scape, about as long as the lvs. and bearing several fls.: sepals and petals deep purple-brown, bordered with green; labellum pale purple in front, becoming deep purple toward the base. F.M. 1880:417. Gt. 28:265.—A garden hybrid raised by Veitch.

Z. Àrmstrongiæ=Z. Mackaii × Z. rostratum.—*Z. Bàllii*, Rolfe. Fls. white, the sepals purple-tinged, the petals and lip blotched with bright rose-purple. G.C. III. 27:149. G.M. 48:365.—*Z. Bùrtii*, Benth.=Huntleya.—*Z. chlorànthum*, Kränzl. Fls. small for the genus, greenish, fragrant, hairy inside.—*Z. cæléste*, Reichb. f.=Bollea.—*Z. discolor*, Reichb. f.=Warscewiczella.—*Z. Lalìndei*, Reichb. f.=Bollea.—*Z. Patìnii*, Reichb. f.=Bollea.—*Z. Prainìdnum*, Rolfe. Sepals and petals dusky brown, with obscure green stripes on petals; lip white, streaked with rose-purple. Peru. B.M. 8610.—*Z. Roeblingiànum*=Z. rostratum × Z. maxillare. G.C. III. 34:227.—*Z. violàceum*, Reichb. f.=Bollea.—*Z. Wèndlandii* Reichb. f.=Warscewiczella.

HEINRICH HASSELBRING.
GEORGE V. NASH.†

ZYGOPHÝLLUM (*yoke leaf*, from the paired or opposite lfts. or lvs.). *Zygophyllàceæ.* Small often spiny twiggy shrubs or subshrubs, with stiff branches, of about 60 species in Eu. and Asia but mostly in S. Afr. and Austral., apparently not in the American trade but likely to be planted for ornament now and then by amateurs in the warmer and drier parts of the country. Lvs. simple or 2-foliolate: fls. white or yellowish or red, on 1-fld. peduncles; calyx 4–5-parted; petals 4 or 5, clawed, twisted; stamens 8–10; disk fleshy and angled; ovary 4- or 5-celled, sessile: fr. an angled or winged caps. Prop. by seeds or cuttings. The species most likely to appear in collections are perhaps *Z. Fabàgo*, Linn., the Syrian bean-caper, with obovate lfts., copper-yellow fls., deep strong root and nearly or quite herbaceous top, S. W. Asia; *Z. Morgsàna*, Linn., with obovate obtuse lfts., long yellow petals, and shrubby habit, from S. Afr.; *Z. spinòsum*, Linn., with linear lfts., yellowish or whitish nodding fls., a small bush only 1–2 ft. high, from S. Afr.

4056. Zygopetalum Mackaii. (×¼)

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SUPPLEMENT

Here are assembled certain lists and addenda that are supplementary to the body of the Cyclopedia, to provide the consultant with additional facilities for the use of the volumes. These appendices are as follows:

Collaborators in the making of the Cyclopedia 3555
Cultivator's guide to the articles 3562
Additional species 3565
New combinations in Latin names 3574
Finding-list of trade names 3575
Index to the six volumes 3611

Other articles of a similar character, providing keys and synopses, are printed in Vol. I, as follows:

	Page
Explanations, comprising a statement of the authorship of articles, nomenclature, pronunciation, spelling, the keys, abbreviations of botanical terms and expressions, books and periodicals to which reference is made, the authors of botanical names	xi
Synopsis of the plant kingdom	(with index) 1–78
Key to the families and genera	(with index) 79–147
Name-list, comprising the English equivalents of Latin names of species	148
Glossary of the usual botanical and horticultural technical words	160
A fuller discussion of nomenclature will be found under "Names and Nomenclature," Vol. IV, 2098; also in the Finding-list	3575

For five years the work of compiling the Standard Cyclopedia of Horticulture has been actively under way. The present office was opened in March, 1912, but the organizing of the work had been started before that time. Although founded on the Cyclopedia of American Horticulture, completed in 1902, the present Cyclopedia is newly organized and newly written. Whenever the articles in the former work have been used as a basis, they have been brought down to date. The preface to Vol. I states the scope and intention of the present work.

The List of Collaborators (pages 3555 to 3561) comprises upward of 400 names, and many other correspondents have aided in less formal ways. To all these helpers the reader will extend his gratitude for the satisfaction he may find in any of the pages. The publishers, printers, artists, writers, and others have coöperated in the freest spirit.

If the consultant desires to know the office methods in compiling a work of this character, he may read the introductory account in Vol. IV of the former Cyclopedia, for the general details do not differ greatly between the two. The Editor gathers his force, finds himself a table and a very few simple accessories, supplies himself with writing materials and books, and then goes to work and holds to it through all the letters from A to Etc. If the reader finds a misplaced letter or accent mark, he may consider that each page comprises about 10,000 pieces of type metal, or more than 36,000,000 pieces for the entire work; these pieces are of many technical devices; and human eyes are fallible. In the first year or two of the work, the Editor was engaged otherwise and could give only small fragments of his time to the Cyclopedia.

If the reader desires statistics of such work, the following figures may interest him:

I. The Number of Articles.

Total number of entries or articles, including cross-references (the sub-articles are the independent articles or parts in the main articles and in the symposia, indicated by black-face lower-case type):

			Cyclo. Amer. Hort. 1902
Volume I	693		
Sub-articles	38		
		731	1,270
Volume II	1,101		
Sub-articles	29		
		1,130	1,263
Volume III	756		
Sub-articles	212		
		968	659
Volume IV	808		
Sub-articles	94		
		902	1,165
Volume V	650		
Sub-articles	64		
		714	
Volume VI	905		
Sub-articles	19	924	
		5,369	
Supplement (additional generic entries)		3	
		5,372	4,357

II. The Number of Plants.

		Cyclo. Amer. Hort. 1902
The number of genera entered:		
Volume I	422	820
Volume II	709	623
Volume III	442	351
Volume IV	550	461
Volume V	449	
Volume VI	639	
Supplement	3	
	3,214	2,255
The number of main species described or entered, in black-face type:		
Volume I	1,801	2,924
Volume II	2,741	2,675
Volume III	1,512	1,405
Volume IV	1,901	1,789
Volume V	2,064	
Volume VI	2,372	
Supplement	102	
	12,493	8,793

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The number of minor species-entries in the main articles, in italic type:		Cyclo. Amer. Hort. 1902
Volume I	267	
Volume II	371	
Volume III	270	
Volume IV	436	
Volume V	396	
Volume VI	320	
	2,060	

The number of species in the supplementary lists, at the end of the various articles, in small italic type (including all but cross-references):		
Volume I	985	2,351
Volume II	1,424	864
Volume III	533	576
Volume IV	993	733
Volume V	1,198	
Volume VI	916	
	6,049	4,524
Total species accounted for	20,602	

The number of synonyms:		
Volume I	1,715	2,446
Volume II	2,379	2,104
Volume III	1,558	1,243
Volume IV	1,727	1,689
Volume V	2,569	
Volume VI	2,444	
Supplement	66	
	12,458	7,482

The number of Latin-named varieties (of species) of all grades in main articles:		Cyclo. Amer. Hort. 1902
Volume I	820	1,187
Volume II	1,272	982
Volume III	795	628
Volume IV	1,031	838
Volume V	1,416	
Volume VI	1,358	
Supplement	23	
	6,715	3,635
Total Latin names accounted for (aside from a few new entries in the Finding-list in Supplement to Vol. VI)	39,775	24,434

III. The Number of Species (in Black-face Type), Native to North America North of Mexico:		
Volume I	353	668
Volume II	551	631
Volume III	358	416
Volume IV	427	704
Volume V	524	
Volume VI	533	
Supplement	7	
	2,753	2,419

IV. The Dates of Publication:	
Volume I	March 25, 1914
Volume II	July 22, 1914
Volume III	May 12, 1915
Volume IV	February 23, 1916
Volume V	October 4, 1916
Volume VI	March 28, 1917

Within the five years several horticulturists have passed away, whose biographies would have been proper subjects for entry in the Cyclopedia. Among such losses are C. E. Bessey, who died February 25, 1915; H. E. Van Deman, April 28, 1915; G. B. Brackett, August 2, 1915; Edwin Lonsdale, September 1, 1915; W. Atlee Burpee, November 26, 1915; William Tricker, July 11, 1916; William S. Lyon, July 20, 1916; Jackson Dawson, August 3, 1916; Ernest Walker, December 5, 1916; W. C. Barry, December 12, 1916.

To spend five years in a review of the vegetable kingdom, with all its marvels and its unsolved problems, is in itself a great privilege. If in addition one may see the applications to the desires of man, may hold associations with several hundred enthusiastic and competent correspondents, may have relations with the commercial and financial questions involved, and may at the same time catch some glimpse of the reaches of evolution and feel a new contact with the earth, the making of a Cyclopedia of this kind becomes not a task but an experience in life. The Editor hopes that the reader may share some of these prospects. The Editor is well aware of the shortcomings of the volumes and he would like to do the work all over again for the delight of it; but this reward must be left for other hands in the years that are to come.

Ithaca, New York,
February 1, 1917.

L. H. BAILEY.

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Comprising those persons who have aided in the making of the Standard Cyclopedia of Horticulture by the writing of articles, proof-reading, and the contributing of information.

**Means a contributor to the Cyclopedia of American Horticulture (1900–1902), whose name appears in the present work.*

‡Means contributor deceased since contribution was made for present Cyclopedia.

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BATCHELOR, L. D., Assoc. Prof. of Plant-Breeding, Citrus Experiment Station, University of California, Riverside, Calif. (*Utah, Walnut in California.*)

BAUR, A. F. J., Carnation Specialist and Sec. American Carnation Society, Indianapolis, Ind. (*Carnation.*)

*BAYERSDORFER, H. (*Everlastings.*)

BEACH, S. A., Prof. of Horticulture, Iowa State College, Ames, Iowa. (*Apple, Corn, H. A. Terry.*)

BEADLE, C. D., Botanist and Horticulturist, Biltmore, N. C. (*Bamboo.*)

BEAL, A. C., Prof. of Floriculture, New York State College of Agriculture, at Cornell University, Ithaca, N. Y. (*Cut-Flower Industry, Florists' Plants, John Craig, Pæonia [Diseases], Rose, Sweet Pea.*)

*BEAL, W. J. (*Grass.*)

BECKENSTRATER, HERMAN, Prof. of Pomology, Maryland State College of Agriculture, College Park, Md. (*Maryland.*)

BENEDICT, R. C., Resident Investigator, Brooklyn Botanic Garden, and Editor "American Fern Journal," 322 E. 19th St., Brooklyn, N. Y. (*Botany of the ferns and their allies.*)

BENNETT, E. R., Field Horticulturist, University of Idaho, Boise, Idaho. (*Colorado.*)

BENNETT, IDA D., Writer, Coldwater, Mich. (*Home Flower-garden.*)

BERCKMANS, L. A., Nurseryman, Augusta, Ga. (*Herbs, Lawns, Magnolia, Planting lists, Pomegranate.*)

*BERCKMANS, P. J. (*Arboriculture, Magnolia, Pinckneya.*)

‡BESSEY, C. E., Prof. of Botany, University of Nebraska, Lincoln, Neb. (*Arboriculture, Evergreens.*)

BETHUNE, C. J. S., Prof. of Entomology and Zoölogy, Ontario Agricultural College, Guelph, Ont. (*Wm. Saunders.*)

BIOLETTI, FREDERIC T., Prof. of Viticulture, College of Agriculture, University of California, Berkeley, Calif. (*Grape, Olive.*)

BLAIR, J. C., Head of Dept. of Horticulture, College of Agriculture, Urbana, Ill. (*Greenhouse Glass, Illinois.*)

BLAKE, M. A., Prof. of Horticulture and Horticulturist of Experiment Station, College of Agriculture, New Brunswick, N. J. (*New Jersey, Peach.*)

BOOTH, N. O., Prof. of Horticulture, Oklahoma Agricultural College, Stillwater, Okla. (*Oklahoma.*)

‡BRACKETT, G. B., Pomologist, U. S. Dept. of Agric., Washington, D. C. (*Aid on biographies.*)

BRAINERD, EZRA, Ex-President Middlebury College, Botanist, Middlebury, Vt. (*Viola.*)

*BRANDEGEE, MRS. KATHERINE. (*Leuchtenbergia, Pelecyphora.*)

BRAUNTON, ERNEST, Landscape Designer and Consulting Horticulturist, 237 Franklin St., Los Angeles, Calif. (*Many notes on California plants.*)

BRITTON, ELIZABETH G. (MRS. N. L.), Botanist, New York Botanical Garden, Bronx, New York City. (*Wild Flowers.*)

BRODRICK, F. W., Prof. of Horticulture and Forestry, Manitoba Agricultural College, Winnipeg, Man. (*Manitoba.*)

*BRUCKNER, NICHOL N. (*Culture of many of the ferns.*)

BRUES, C. T., Asst. Prof. of Economic Entomology, Harvard University, Bussey Institution, Forest Hills, Mass. (*Arboriculture.*)

BRUNS, H. N., Florist, 3042 W. Madison St., Chicago, Ill. (*Lily-of-the-Valley.*)

*BURBANK, LUTHER. (*Nicotunia.*)

*BUTZ, GEO. C. (*Carnation.*)

CADY, LEROY, Assoc. Prof. of Horticulture, College of Agriculture, University of Minnesota, University Farm, St. Paul, Minn. (*Minnesota, several biographies.*)

*CAMERON, ROBERT. (*Many cultural notes.*)

CANNING, EDWARD J., Practical Landscape Architect, Northampton, Mass. For several years curator of the Smith College Botanic Gardens. (*Notes on culture of many plants and phases of gardening.*)

CHASE, MRS. AGNES, Scientific Asst. in Systematic Agrostology, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Much help on the grasses.*)

CHEYNEY, E. G., Dir. of the College of Forestry, University of Minnesota, University Farm, St. Paul, Minn. (*O. M. Lord.*)

CHURCH, J. E., JR., Meteorologist of Agricultural Experiment Station, University of Nevada, Reno, Nev. (*Nevada.*)

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CLARK, JAMES C., Florist, Henry A. Dreer, 714 Chestnut St., Philadelphia, Pa. (*Adiantum.*)

CLARKE, W. T., Prof. Agricultural Extension, University of California, Berkeley, Calif. (*California public-service agencies.*)

CLEMENT, F. M., Prof. of Horticulture, Univ. of British Columbia, Vancouver, B. C.; formerly Dir. Horticultural Exp. Station, Vineland, Ontario. (*Grape, Quince.*)

CLINTON, L. A., Agriculturist and Asst. Chief, Office of Extension Work, North and West, States Relations Service, U. S. Dept. of Agric., Washington, D. C. (*Soybean, Spurry.*)

COCKAYNE, L., Botanist, Wellington, New Zealand. (*Veronica.*)

COCKERELL, T. D. A., Prof. of Zoölogy, University of Colorado, Boulder, Colo. (*Helianthus, Sunflower.*)

COIT, J. ELIOT, Prof. of Citriculture, College of Agriculture, University of California, Berkeley, Calif. (*Grapefruit, Lemon, Orange, T. A. Garey.*)

COLLINGWOOD, H. W., Editor "Rural New-Yorker," New York City. (*E. S. Carman.*)

CONARD, H. S., Prof. of Botany, Grinnell College, Grinnell, Iowa. (*Botany of the Nymphæaceæ.*)

CONARD, THOMAS P., Broker in machinery, Lansdowne, Pa. (*A. F. Conard.*)

COOPER, J. R., Assoc. Prof. of Horticulture, College of Agriculture, University of Nebraska, Lincoln, Neb. (*Nebraska.*)

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CORBETT, L. C., Horticulturist in Charge of Horticultural and Pomological Investigations, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Many articles on vegetables, Machinery.*)

*COULSTON, M. B. (*W. B. Stiles, Mitella, Morinda, Narthecium, Ononis.*)

*COULTER, JOHN M. (*Echinocactus.*)

COVILLE, FREDERICK V., Botanist, U. S. Dept. of Agric., Washington, D. C. (*Blueberry, Epigæa.*)

COWEE, ARTHUR, Gladiolus Specialist, Berlin, N. Y. (*Gladiolus.*)

COWELL, ARTHUR W., Landscape Architect; Assoc. Prof. of Landscape Gardening, State College, Pa. (*Landscape Gardening, Walks, Paths, and Driveways.*)

*COWELL, J. F. (*Phormium.*)

*COWEN, J. H. (*Lepachys, Leucocrinum, Verbena.*)

*CRAIG, JOHN. (*Fruit-Growing, Rape.*)

*CRAIG, ROBERT. (*Codiæum.*)

CRAIG, W. N., Supt. Faulkner Farm, Brookline, Mass. (*Herbs.*)

CRANEFIELD, FREDERIC, Sec. Wisconsin State Horticultural Society, Madison, Wis. (*Wisconsin.*)

*CROPP, CARL. (*Stocks.*)

CROSBY, C. R., Extension Prof. of Entomology, New York State College of Agriculture, Ithaca, N. Y. (*Diseases and Insects, Rose Insects, Sowbugs.*)

CROW, J. W., Prof. of Horticulture, Ontario Agricultural College, Guelph, Ont. (*Ontario.*)

CUMMINGS, M. B., Prof. of Horticulture and Horticulturist of Experiment Station, College of Agriculture, Burlington, Vt. (*Vermont.*)

CURTIS, RALPH W., Prof. of Landscape Art, New York State College of Agriculture, Ithaca, N. Y. (*Evergreens, Screen-Planting, Planting lists.*)

*CUSHMAN, E. H. (*Gladiolus.*)

*DARLINGTON, H. D., (*Platytheca.*)

DARROW, GEO. M., Scientific Asst., Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Raspberry.*)

DAVIS, K. C., Prof. of Agriculture, George Knapp School of Country Life, Peabody College for Teachers, Nashville, Tenn. (*Many genera of the Ranunculaceæ.*)

*DAVY, JOS. BURTT. (*Arboriculture, Myrtus,* etc.)

DEAN, M. L., State Horticulturist, Missoula, Mont. (*Montana.*)

DEANE, WALTER, Botanist, 29 Brewster St., Cambridge, Mass. (*Herbarium.*)

*DEWEY, LYSTER H. (*Mentha.*)

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DORNER, H. B., Asst. Prof. of Floriculture, College of Agriculture, Urbana, Ill. (*Frederick Dorner.*)

DORSETT, P. H., In Charge of Plant Introduction Field Stations, U. S. Dept. of Agric., Washington, D. C. (*Violet.*)

DOUGLAS, R., SONS, Nurserymen, Waukegan, Ill. (*T. H. Douglas.*)

*DOUGLAS, THOMAS H. (*Picea.*)

*DREW, E. P. (*Picea.*)

DUGGAR, B. M., Prof. of Plant Physiology, in Charge of Graduate Laboratory, Missouri Botanical Garden, St. Louis, Mo. (*Autumn Colors, Fertilization, Mushroom, etc.*)

DUGGAR, J. F., Dir. Experiment Station, Auburn, Ala. (*Alabama.*)

DUNBAR, JOHN, Asst. Supt. of Parks, Rochester, N. Y. (*Berberis, Cratægus, Rhododendron.*)

DUNNING, D. M., Pres. Auburn Savings Bank, Auburn, N. Y. (*Grape.*)

*DUPUY, LEWIS. (*Erica.*)

EDWARDS, CHARLES L., Horticulturist, Dallas, Texas. (*Help on Pecan.*)

EGAN, W. C., Amateur Horticulturist, Highland Park, Ill. (*Everlastings, Mertensia, Winter Protection.*)

*EISELE, J. B. (*Cordyline.*)

*ELLIOTT, WILLIAM H. (*Asparagus Fern.*)

EMORY, E. W., Chestertown, Md. (*R. S. Emory.*)

*ENDICOTT, W. E. (*Ixia.*)

ERWIN, A. T., Chief Truck Crops, Agricultural Experiment Station, Ames, Iowa. (*Himalaya Berry.*)

EUSTACE, H. J., Prof. of Horticulture, Michigan Agricultural College, East Lansing, Mich. (*Marketing, Packages.*)

EVANS, WALTER H., Chief of Insular Stations, States Relations Service, U. S. Dept. of Agric., Washington, D. C. (*Alaska.*)

FAIRCHILD, DAVID, Agricultural Explorer in Charge, Office of Foreign Seed and Plant Introduction, Bur. of Plant. Ind., U. S. Dept. of Agric., Washington, D. C. (*Mangosteen, and much help on tropical fruits and vegetables.*)

FARRELL, J. J. M., Gardener on C. D. Matthews Estate, Norwalk, Conn. (*Cultural notes on many glasshouse plants.*)

*FAWCETT, WM. (*Cinchona, Myristica.*)

FERNOW, B. E., Dean Faculty of Forestry, University of Toronto, Toronto, Ont. (*Arboriculture, Forestry, Pine.*)

*FINLAYSON, KENNETH. (*Diosma.*)

FLEMING, BRYANT, Landscape Architect, Prudential Bldg., Buffalo, N. Y. (*Pergola.*)

FLETCHER, S. W., Prof. of Horticulture, State College, Pa. (*Pollination, Strawberry.*)

FOGLESONG, L. E., Landscape Architect, Paddock Bldg., Boston, Mass. (*Herbs.*)

FORBES, R. H., Dir. Arizona Agricultural Experiment Station, Tucson, Ariz. (*Arizona.*)

FRANCESCHI, F., Dir. Stabilmento Orticolo Libico, Tripoli. (Formerly of Santa Barbara, Calif.) (*Many notes on California plants.*)

FREEMAN, GEO. F., Plant-Breeder of Experiment Station, Tucson, Ariz. (*Bean, Cowpea, Dolichos, Phaseolus, Vigna.*)

FROST, CHARLES, Pansy Seed Grower, Kenilworth, N. J. (*Pansy.*)

GAGER, C. STUART, Dir. Brooklyn Botanic Garden, Brooklyn, N. Y. (*Botanic Garden.*)

GALLOWAY, B. T., Plant Pathologist and Plant Introducer, U. S. Dept. of Agric., Washington, D. C. (*Violet.*)

GARCIA, FABIAN, Dir. of Experiment Station, State College, New Mex. (*New Mexico.*)

GARFIELD, CHAS. W., Banker, Grand Rapids, Mich. (*Exhibition.*)

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GATES, BURTON N., Assoc. Prof. Bee-Keeping and Apiarist of Experiment Station, Massachusetts Agricultural College, Amherst, Mass. (*Bees.*)

GERARD, J. N., Amateur Horticulturist, Elizabeth, N. J. (*Many articles, especially on bulbous plants, as Crocus, Iris, Narcissus, etc.*)

GILBERT, A. W., Prof. of Plant-Breeding, New York State College of Agriculture, Ithaca, N. Y. (*Potato.*)

GILL, JOHN, Nurseryman, West Berkeley, Calif. (*List of Roses.*)

GOULD, H. P., Pomologist in Charge of Fruit Production Investigations, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Celeriac.*)

GOURLEY, J. H., Prof. of Horticulture, College of Agriculture, Durham, N. H. (*New Hampshire.*)

GREEN, W. J., Horticulturist and Vice-Dir. of Experiment Station, Wooster, Ohio. (*Sub-Irrigation in the Greenhouse, Ohio.*)

‡GREENE, E. L., Botanist, Notre Dame University, Terre Haute, Ind. (*Help on Convallaria.*)

*GREENLEE, L. (*Ixia.*)

GREENMAN, J. M.. Assoc. Prof. of Botany at Washington University, and Curator of Herbarium, Missouri Botanical Garden, St. Louis, Mo. (*Senecio.*)

GREFFRATH, HENRY, Market-Gardener, South Lima, N. Y. (*Muckland-Gardening.*)

GREGG, JOHN WM., Prof. of Landscape Gardening and Floriculture, College of Agriculture, University of California, Berkeley, Calif. (*Herbs, Planting lists.*)

GREGORY, EDGAR, Seedsman, Marblehead, Mass. (*J. J. H. Gregory.*)

GREINER, T., Market-Gardener, La Salle, N. Y. (*Many articles on vegetables.*)

*GREY, ROBERT M. (*Culture of many genera of orchids.*)

HALE, J. H., Fruit-Grower, South Glastonbury, Conn. (*Connecticut, Peach.*)

HALL, HARVEY MONROE, Assoc. Prof. of Botany and Botanist of Experiment Station, University of California, Berkeley, Calif. (*Several woody genera, as Callistemon, Eucalyptus, Eugenia, Pittosporum, etc.*)

*HANSEN, GEORGE. (*Epidendrum.*)

HANSEN, N. E., Prof. of Horticulture and Forestry, State College of Agriculture, Brookings, S. D. (*Buffalo Berry, South Dakota.*)

*HARRISON, C. S. (*Pseudotsuga.*)

HARSHBERGER, JOHN W., Prof. of Botany, University of Pennsylvania, Philadelphia, Pa. (*Lathyrus, Lupinus, Oxytropis, Poisonous Plants, Pyxidanthera, Saprophyte, Scilla, Smut, Symbiosis.*)

*HART, J. H. (*Theobroma.*)

HASSELBRING, HEINRICH, Physiologist, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Many genera of Orchids, Iris, Mildew, Moulds, Orchids, Rusts.*)

HASTINGS, G. T., DeWitt Clinton High School, New York City. (*Berria, Bertholletia, Bursera.*)

HATFIELD, T. D., Supt. of the Walter Hunnewell Estate, Wellesley, Mass. (*Several cultural articles.*)

HAWKS, EMMA B., Asst. Librarian of U. S. Dept. of Agric. Library, Washington, D. C. (*Aid on book-list.*)

HEDRICK, U. P., Horticulturist of Experiment Station, Geneva, N. Y. (*Blackberry, Cherry, Dewberry, Dwarfing, Evaporating, Experiment Stations, Juneberry, New York.*)

*HENDERSON, L. F. (*Phacelia.*)

HENDERSON, PETER, & Co., Seedsmen, 35 and 37 Cortlandt St., New York City. (*Bulbs, Polianthes.*)

HENDRICKSON, ISAAC S., Manager for Wholesale Dept. of John Lewis Childs, Inc., and Pres. American Gladiolus Soc., Flowerfield, N. Y. (*Gladiolus.*)

‡HENREL, ALICE, Asst. in Economic and Systematic Botany, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Notes on medicinal plants.*)

HENRY, A., Prof. of Forestry, Royal College of Science, Dublin, Ireland. (*Help on Populus.*)

HERRICK, G. W., Prof. of Economic Entomology, New York State College of Agriculture, Ithaca, N. Y. (*Ants.*)

HEWS, A. H. & Co., INC., Manufacturers of flower-pots, Cambridge, Mass. (*Pots.*)

*HEXAMER, F. M. (*A. S. Fuller, Geo. Thurber.*)

HICKS, HENRY, Nurseryman, Westbury, L. I., N. Y. (*Arboriculture, Drainage, Evergreens, Ligustrum.*)

HIGGINS, J. E., Horticulturist of the U. S. Experiment Station, Honolulu, Hawaii. (*Hawaiian Islands.*)

HILL, D. H., Pres. College of Agriculture and Mechanic Arts, West Raleigh, N. C. (*T. K. Bruner.*)

HITCHCOCK, A. S., Agrostologist, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Botany of the genera of grasses.*)

HITCHINGS, E. F., Assoc. Prof. of Horticulture, College of Agriculture, Orono, Maine. (*Maine.*)

*HORSFORD, F. H. (*Aquilegia.*)

HOTTES, A. C., Asst. Prof. of Floriculture, Ohio State University, Columbus, Ohio. (*Gladiolus, and several genera.*)

HOUSE, H. D., State Botanist, Albany, N. Y. (*Convolvulus, Ibidium, Ipomœa, Quamoclit.*)

HOWARD, W. L., Assoc. Pomologist, Experiment Station, Davis, Calif. (*Rest-Period.*)

HUBBARD, F. TRACY, Botanist, 535 Beacon St., Boston, Mass. (*Many articles in Volumes V and VI.*)

*HUEY, ROBERT. (*Rose.*)

HUME, H. HAROLD, Nurseryman, Glen Saint Mary, Fla. (*Fig, Kumquat, Lemon, Lime, Orange.*)

HUNN, C. E., Asst. in Plant Propagation, New York State College of Agriculture, Ithaca, N. Y. (*Strawberry Forcing, Window-Gardening.*)

HUSS, JOHN F., Head Gardener to J. J. Goodwin, Esq., Estate, Hartford, Conn. (*Many notes on hardy plants.*)

HUTT, W. N., State Horticulturist, Department of Agriculture, Raleigh, N. C. (*North Carolina.*)

IRISH, H. C., Supervisor School Gardening, 1227 Childress Ave., St. Louis, Mo. (*Capsicum, Lactuca, Pepper, Planting list, Rose, Tetragonia.*)

*JACKSON & PERKINS CO. (*Clematis.*)

*JACOB, CHAS. W. & ALLISON. (*Raffia.*)

JARVIS, C. D., Specialist in Agricultural Education, Bureau of Education, Washington, D. C.; formerly Director Extension Service, Conn. Agric. College. (*Apple.*)

JEPSON, W. L., Assoc. Prof. of Botany, University of California, Berkeley, Calif. (*Godetia.*)

JOHNSON, T. C., Dir. Virginia Truck Experiment Station, Norfolk, Va. (*Potato.*)

JONES, KATHERINE D., Asst. Landscape Gardening, College of Agric., University of California, Berkeley, Calif. (*Acacia, Herbs, Planting lists.*)

JONES, L. R., Prof. of Plant Pathology, College of Agriculture, University of Wisconsin, Madison, Wis. (*C. G. Pringle.*)

KAINS, M. G., Horticultural Consultant, Port Washington, N. Y. (*Culture of many culinary herbs.*)

*KEARNEY, T. H. (*A few genera of orchids.*)

KEFFER, CHAS. A., Dir. of Extension Division, College of Agriculture, University of Tennessee, Knoxville, Tenn. (*Tennessee.*)

*KELLER, J. B. (*Notes on many groups of hardy herbaceous perennials.*)

KELLERMAN, KARL F., Physiologist and Asst. Chief of Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Legumes.*)

KELLERMAN, MAUDE. See *Swingle.*

*KELSEY, HARLAN P. (*Galax, Helonias, Leucothoë.*)

*KENNEDY, P. B. (*A few genera of grasses.*)

KINMAN, C. F., Horticulturist of U. S. Experiment Station, Mayagues, Porto Rico. (*Porto Rico.*)

KNIGHT, HENRY G., Dean College of Agriculture, University of Wyoming, Laramie, Wyo. (*Poisonous Plants.*)

KNUDSON, LEWIS, Asst. Prof. of Botany and Plant Physiology, New York State College of Agriculture, Ithaca, N. Y. (*Etherization.*)

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KYLE, E. J., Prof. of Horticulture and Dean of the School of Agriculture, College Station, Texas. (*Texas, Tomato in South.*)
*LAGER, JOHN E. (*Cattleya culture.*)
*LANDRETH, BURNET. (*David Landreth.*)
LEONARD, M. D., Extension Asst. of Entomology, New York State College of Agriculture, Ithaca, N. Y. (*Rose Insects, Sowbugs.*)
LEWIS, C. I., Prof. of Horticulture, State Agricultural College, Corvallis, Ore. (*Apple, Loganberry, Oregon, Prune.*)
LEWIS, F. H., Pecan Orchardist and Nurseryman, Pascagoula, Miss. (*Mississippi.*)
LEWTON, FREDERICK L., Curator, Division of Textiles, U. S. National Museum, Washington, D. C. (*Gums and Resins.*)
LLOYD, JOHN W., Prof. of Olericulture, College of Agriculture, University of Illinois, Urbana, Ill. (*Exhibitions, Muskmelon, Vegetable-Gardening.*)
LORD & BURNHAM CO., Greenhouse Designers and Manufacturers, Irvington-on-Hudson, N. Y. (*Greenhouse.*)
LOVELESS, ALFRED J., Gardener, Lenox, Mass. (*Paphiopedilum, Phalænopsis.*)
LUMSDEN, DAVID, Asst. Prof. of Floriculture, New York State College of Agriculture, Ithaca, N. Y. (*Lilium, Narcissus.*)
*LYON, T. T. (*Pear.*)
MACDOUGAL, D. T., Dir. Department of Botanical Research, Carnegie Institution of Washington, Desert Laboratory, Tucson, Ariz. (*Sap, Transpiration.*)
MACFARLANE, J. M., Prof. of Botany, Dir. of the Botanic Garden, University of Pennsylvania, Philadelphia, Pa. (*Darlingtonia, Dionæa, Drosera, Nepenthes, Sarracenia.*)
MACOUN, W. T., Dominion Horticulturist, Central Experimental Farm, Ottawa, Canada. (*Apple, British North America, Currant, Gooseberry, Herbs, several biographies.*)
MANNING, WARREN H., Landscape Designer, North Billerica, Mass. (*Banks, Herbs, Landscape Gardening, Planting articles, Rock-Garden.*)
MARLATT, C. L., Chairman Federal Horticultural Board, Washington, D. C. (*Inspection.*)
*MASON, S. C. (*Labels, Layering.*)
MASSEY, L. M., Instr. Plant Pathology, New York State College of Agriculture, Ithaca, N. Y. (*Rose Diseases.*)
MATHESON, ROBERT, Asst. Prof. of Economic Entomology, New York State College of Agriculture, Ithaca, N. Y. (*Diseases and Insects.*)
MATHEWS, C. W., Prof. of Horticulture, College of Agriculture, University of Kentucky, Lexington, Ky. (*Kentucky.*)
MATHEWS, F. SCHUYLER, Artist and Author, 17 Frost St., Cambridge, Mass. (*Color, Standards of Color.*)
*MATHEWS, WM. (*Culture of many orchids.*)
MAXON, WILLIAM R., Assoc. Curator, National Herbarium, U. S. National Museum, Washington, D. C. (*Tree Ferns.*)
MAYNARD, S. T., Horticultural Specialist and Landscape Gardener, Northboro, Mass. (*Massachusetts.*)
MCCLELLAND, T. B., Asst. Horticulturist, U. S. Experiment Station, Mayaguez, Porto Rico. (*Coffea.*)
MCCUE, C. A., Prof. of Horticulture, Delaware College, Newark, Del. (*Delaware.*)
MCFARLAND, J. HORACE, Printer, Author, Lecturer, Harrisburg, Pa. (*Border, Garden Cities, Photography.*)
MCHATTON, T. H., Prof. of Horticulture, State College of Agriculture, Athens, Ga. (*Biographies, Georgia, Pear.*)
*MEEHAN, JOSEPH. (*Maclura.*)
MEEHAN, W. E., Nurseryman, Germantown, Philadelphia, Pa. (*Thos. Meehan.*)
MENDERSON, NATHAN, Asst. in Plant Introduction, Office of Foreign Seed and Plant Introduction, U. S. Dept. of Agric., Washington, D. C. (*Sechium.*)
*MEREDITH, A. P. (*Humea.*)
MICHEL, EUGENE H., Supt. Dreer's Nurseries, Riverton, N. J. (*Help on Canna.*)
MILLER, WILHELM, Landscape Architect, 64 E. Van Buren St., Chicago, Ill. (*Autumn-Gardening, Biennials, Chrysanthemum, Herbs, Landscape Extension, Planting articles, and many biographies and genera.*)
MINER, WM. W., Farmer and Fruit-Grower, Palmyra, N. Y. (*A. M. Purdy.*)
MITCHELL, ARCH, Nurseryman, Coaldale, Alberta (*Alberta.*)
MITCHELL, SYDNEY B., University of California Library, Berkeley, Calif. (*Culture of Gladiolus, Iris, Ixia.*)
MONTILLON, EUGENE D., Instr. Landscape Art, New York State College of Agriculture, Ithaca, N. Y. (*Topiary Work.*)
MOON, HENRY T., Nurseryman, Morrisville, Pa. (*James Moon.*)
MOORE, ALBERT HANFORD, Botanist and Photographic Reproducer, 3 Divinity Ave., Cambridge, Mass. (*Escallonia, Philadelphus, Spilanthes.*)
MORRIS, O. M., Head of Horticultural Dept., State College, Pullman, Wash. (*Washington.*)
MORRIS, ROBT. T., Surgeon, 616 Madison Ave., New York City. (*Nut-culture.*)
MORRISON, B. Y., Landscape Architect, Takoma Park, D. C. (*Arboriculture.*)
MORRISON, WM. S., Prof. of History and Political Economy, Clemson College, S. C. (*J. S. Newman.*)
MORSE, C. C. & Co., Seed-growers and Dealers, 739–759 Front St., San Francisco, Calif. (*Seeds.*)
MULFORD, F. L., Landscape Gardener, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Arboriculture, Evergreens, Hedges, Planting list.*)
‡MUNSON, T. V., Nurseryman, Denison, Texas. (*Grape, Texas.*)
*MUNSON, W. M. (*Vaccinium.*)
NASH, GEORGE V., Head Gardener, New York Botanical Garden, Bronx Park, New York City. (*Botany of most of the genera of orchids, aroids, and bromeliads.*)
NEHRLING, H., Horticulturist, Palm Cottage Gardens, Gotha, Fla. (*Cultural notes on many Florida plants.*)
NELSON, AVEN., Prof. of Botany, University of Wyoming, and State Horticulturist, Laramie, Wyo. (*Wyoming.*)
*NEWBURY, H. E. (*Polianthes.*)
NEWBURY, W. R., Magnolia, N. C. (*Polianthes.*)
NEWMAN, C. C., Prof. of Horticulture and Horticulturist of Experiment Station, Clemson College, S. C. (*South Carolina.*)
NORTON, J. B., Physiologist, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Asparagus, Smilax.*)
NORTON, J. B. S., Prof. of Botany, Maryland Agricultural College, College Park, Md. (*Botany of the Euphorbiaceæ.*)
O'GARA, P. J., Pathologist and Chief in Charge of Agricultural Investigations, American Smelting and Refining Co., Salt Lake City, Utah. (*Frost.*)
*O'MARA, PATRICK. (*Potting.*)
OLIVER, G. W., Plant-Breeder, U. S. Dept. of Agric., Washington, D. C. (*Many articles on palms, aroids, succulents, and rare plants.*)
OLMSTED, JOHN C., Landscape Architect, Brookline, Mass. (*F. L. Olmsted, Parks.*)
ORPET, E. O., Plant Propagator, U. S. Plant Introduction Field Station, Chico, Calif. (*Culture of many orchids, Border, Osmundine, etc.*)
PADDOCK, WENDELL, Prof. of Horticulture, Ohio State University, Columbus, Ohio. (*Peach.*)
PARSONS, SAMUEL, Landscape Architect, Architects' Bldg., 101 Park Ave., New York City. (*Lawns.*)
*PEACOCK, LAWRENCE K. (*Dahlia.*)
PEASE, A. S., Prof. of the Classics, University of Illinois, Urbana, Ill. (*Help on Name-List.*)
PETERSON, WM. A., Nurseryman, Chicago, Ill. (*Pæonia.*)
PIERSON, W. R., Florist, Cromwell, Conn. (*Rose.*)

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PILAT, C. F., Landscape Architect to the Park Board, 52 Broadway, New York City. (*Planting.*)

PIPER, C. V., Agrostologist in Charge, Bureau of Plant Industry, U. S. Dept. of Agric., Washington, D. C. (*Glycine.*)

PITTIER, H., Botanist, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Pachira.*)

POPENOE, F. W., Agricultural Explorer, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Culture and botany of many tropical fruits.*)

PRICE, H. L., Dean of Agricultural Dept., Virginia Agricultural College, Blacksburg, Va. (*Virginia.*)

*PRINCE, L. B. (*Wm. Prince.*)

PRING, G. H., Foreman, Exotic Orchid and Aquatic Depts., Missouri Botanical Garden, St. Louis, Mo. (*Oxalis, Peristeria, Phaius, Pinguicula.*)

PURDY, CARL, Nurseryman, Specialist in hardy perennials, Ukiah, Calif. (*California native plants, as Brodiæa, Calochortus, etc.*)

RAFFILL, C. P., Gardener, Royal Botanic Gardens, Kew, England. (*Culture of Achimenes, Calathea, etc.*)

RAMSEY, H. J., Pomologist, Bur. of Plant. Ind., U. S. Dept. of Agric., Washington, D. C. (*Transportation.*)

RANKIN, W. H., Asst. Prof. Plant Pathology, New York State College of Agriculture, Ithaca, N. Y. (*Arboriculture.*)

*RAWSON, GROVE. P. (*Lantana.*)

*REASONER, E. N. (*Banana and many other articles on semi-tropical plants.*)

REDDICK, DONALD., Prof. of Plant Pathology, New York State College of Agriculture, Ithaca, N. Y. (*Damping-off, Diseases.*)

REED, C. A., Nut-Culturist, Bur. of Plant. Ind., U. S. Dept. of Agric., Washington, D. C. (*Nuts, Walnut.*)

REED, WM. N., 122 W. 25th St., New York City. (*Everlastings.*)

REHDER, ALFRED, Botanist, Arnold Arboretum, Jamaica Plain, Mass. (*Most of the hardy trees and shrubs, Names and Nomenclature, many notes and much advice.*)

RICH, WM. P., Sec. Massachusetts Horticultural Society, Boston, Mass. (*S. W. Cole.*)

RICHARDS, M. W., Assoc. Horticulturist, Purdue Experiment Station, La Fayette, Ind. (*Indiana.*)

RICKER, P. L., Asst. Botanist, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Musa, Nicotiana, and several leguminous genera.*)

RIXFORD, G. P., Physiologist, Bur. of Plant. Ind., U. S. Dept. of Agric., 1813 Pierce St., San Francisco, Calif. (*Ceratonia, Pistacia, Zizyphus.*)

ROBERTS, I. P., Prof.-Emeritus of Agriculture, Cornell University; Residence, Berkeley, Calif. (*Drainage, Fertility, Manure.*)

ROBINSON, ALBERT E., Gardener to Louis Ettlinger, Peekskill, N. Y. (*Leontopodium.*)

ROBINSON, B. L., Prof. of Systematic Botany and Curator of the Gray Herbarium, Harvard University, Cambridge, Mass. (*Ageratum, Eupatorium.*)

ROEDING, GEO. C., Nurseryman, Fresno, Calif. (*F. C. Roeding, Peach.*)

ROGERS, STANLEY S., Assoc. Prof. of Plant Pathology, College of Agriculture, University of California, Berkeley, Calif. (*Celery in California.*)

ROLFS, P. H., Dean, Florida Agricultural College, Dir. Agricultural Experiment Station; Dir. of Coöperative Agricultural Extension Work, Gainsville, Fla. (*Celery, Eggplant, Florida, Okra, Onion, Pineapple.*)

ROSE, J. N., Research Assoc., Carnegie Institution of Washington; Assoc. in Botany, U. S. National Museum, Washington, D. C. (*Cactaceæ and some Crassulaceæ.*)

ROSE, N. J., 448 East 137th St., New York City. (*Bomarea.*)

ROSS, THEODORE, Sec. for Agriculture, Charlottetown, P. E. I. (*Prince Edward Island.*)

*ROTH, F. (*Fagus.*)

ROTHE, RICHARD, Nurseryman, Glenside, Pa. (*Notes on culture of many hardy garden herbs.*)

ROWLEE, W. W., Prof. of Botany, Cornell University, Ithaca, N. Y. (*Liatris, Salix.*)

SAFFORD, W. E., Economic Botanist, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*The Annonaceæ, Avicenna, Bull-Horn, Chiranthodendron, Cycas, Gynopogon, Tutuila, Lophophora.*)

SARGENT, C. S., Dir. Arnold Arboretum, Jamaica Plain, Mass. (*Abies, Arboretum, F. L. Ames, H. W. Sargent.*)

SAUL, B. F., Banker, Washington, D. C. (*John Saul.*)

SCHEEPERS, JOHN, & Co., INC., Flower Bulb Specialists, 2 Stone St., New York City. (*Help on Tulipa.*)

SCHMITT, X. E. E., Head Gardener, Horticultural Hall, Fairmount Park, Philadelphia, Pa. (*Ferns.*)

*SCOTT, WILLIAM. (*Many cultural articles.*)

SEARS, F. C., Prof. of Pomology, Massachusetts Agricultural College, Amherst, Mass. (*C. R. Prescott.*)

*SEAVEY, FRANCES COPLEY. (*Railroad-Gardening.*)

*SEXTON, JOSEPH. (*Pampas-Grass.*)

SHAW, GEORGE W., Land Expert, 74 New Montgomery St., San Francisco, Calif. (*Bean.*)

SHAW, PERCY J., Horticulturist, Agricultural College, Truro, N. S. (*Nova Scotia.*)

SHINN, CHARLES H., Writer, Northfork, Calif. (*Fig, John Rock, James Shinn, California, Sequoia.*)

*SHORE, ROBERT. (*Bedding, Begonia, Marguerite.*)

SHULL, GEO. H., Prof. of Botany and Genetics, Princeton University, Princeton, N. J. (*Xenia.*)

SIEBRECHT, H. A., Florist and Nurseryman, New Rochelle, N. Y. (*Billbergia, Ficus, Gardenia, etc.*)

SIMONDS, O. C., Landscape Gardener, 1101 Buena Ave., Chicago, Ill. (*Adolph Strauch, Landscape Cemeteries, Shrubbery.*)

SIMPSON, CHAS. T., Collaborator, U. S. Dept of Agric., Little River, Fla. (*Many notes on Florida plants, P. F. Reasoner.*)

*SLINGERLAND, M. V. (*Diseases and Insects.*)

SMITH, CORA A., Teacher of Biology, Erie, Pa. (*Birds.*)

SMITH, ELMER, Florist, Adrian, Mich. (*Chrysanthemum.*)

SMITH, IRVING C., Market-Gardener and Fruit-Grower, Ashland, Wis. (*Onion.*)

*SMITH, JARED G. (*Many genera of palms.*)

STANDLEY, PAUL C., Asst. Curator, U. S. National Herbarium, Washington, D. C. (*Help on Pentstemon.*)

*STEELE, E. S. (*Perfumery-Gardening.*)

STEVENS, R. T., Asst. Prof. of Landscape Gardening, College of Agriculture, University of California, Berkeley, Calif. (*Herb, Planting lists.*)

STEWART, GEO. F., Gardener on the Gen. S. C. Lawrence Estate, Medford, Mass. (*Articles on the culture of many greenhouse plants.*)

STEWART, JOHN P., Experimenter in Pomology, Experiment Station, State College, Pa. (*Pennsylvania.*)

STEWART, WM. J., Editor "Horticulture," Boston, Mass. (*Exhibitions.*)

STONE, G. E., Prof. of Botany, Vegetable Physiology and Pathology, Massachusetts Agricultural College, Amherst, Mass. (*Electro-Horticulture, Light.*)

STRAIGHT, E. M., State Specialist in Vegetable-Gardening, College of Agriculture, Durham, N. H.; formerly of Canada. (*Quebec.*)

STUBENRAUCH, A. V., Prof. of Pomology, College of Agriculture, University of California, Berkeley, Calif. (*Storage, Tulipa, etc.*)

STUNTZ, S. C., Botanical Assistant, Office of Foreign Seed and Plant Introduction, Washington, D. C. (*Carica, Carissa.*)

*STURTEVANT, EDMUND D. (*Nymphæa.*)

SWINGLE, MAUDE KELLERMAN (Mrs. W. T.), Botanical Assistant, Bureau of Plant Industry, U. S. Dept. of Agric., Washington, D. C. (*Collaborated with Walter T. Swingle on Citropsis and other genera of the Citrus subfamily.*)

SWINGLE, WALTER T., In charge of Crop Physiology and Breeding Investigations, Bur. of Plant. Ind., U. S. Dept. of Agric., Washington, D. C. (*Genera of the Citrus subfamily.*)

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TAFT, L. R., Supt. Farmers' Institutes, State Inspector of Orchards and Nurseries, East Lansing, Mich. (*Greenhouse heating, Hotbeds, Michigan.*)

TANIMURA, ISSA, Dir. of Japan Forage Experiment Station, and Pres. of "Soyoho," Tokyo, Japan. (*Dwarfing, Japanese Gardening.*)

*TAPLIN, W. H. (*Many genera of palms.*)

TAYLOR, A. D., Landscape Architect, 1900 Euclid Ave., Cleveland, Ohio. (*Drainage for Landscape Work.*)

TAYLOR, NORMAN, Curator of Brooklyn Botanic Garden, Brooklyn, N. Y. (*Many Compositæ, Palmaceæ, and Araliaceæ, Alpine Plants, Bog-Gardening, and many other articles.*)

TAYLOR, WM. A., Chief of Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Apple, Chestnut, Gevuina, Ginkgo, Hazel-nut, Hickory-nut, Pecan.*)

THILOW, J. OTTO, Florist, Sec. Henry A. Dreer, Inc., 714 Chestnut St., Philadelphia, Pa. (*Leek, Machinery.*)

THOMPSON, C. H., Asst. Prof. of Horticulture, Massachusetts Agricultural College, Amherst, Mass. (*Bryophyllum, Succulents.*)

THOMPSON, H. C., Horticulturist, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Strawberry in the South.*)

THOMPSON, J. B., Asst. Agronomist of U. S. Experiment Station, Honolulu, Hawaii. (*Guam.*)

THORBURN, J. M. & Co., Seedsmen, 53 Barclay St., New York City. (*Hyacinthus, Seeds.*)

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TILTON, JOHN H., Gardener, Salem, N. H. (*Lilium.*)

TOMPSON, H. F., Prof. and Head Dept. of Market-Gardening, Massachusetts Agricultural College, Amherst, Mass. (*Carrot, Cucumber.*)

*TOUMEY, J. W. (*Date, Opuntia, Root-Galls.*)

TRACY, S. M., Agronomist, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Mississippi, Stizolobium.*)

TRACY, W. W., Supt. of Testing Gardens, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Cabbage, Lettuce, Pea, Radish, Seeds, Tomato.*)

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‡TRICKER, WILLIAM, Specialist in Aquatics, Arlington, N. J. (*Aquarium, Aquatics, Nymphæa, Water-Gardening, and many aquatic plants.*)

TRULLINGER, ROBERT W., Specialist in Rural Engineering, U. S. Dept. of Agric., Washington, D. C. (*Machinery.*)

TUCKER, E. S., formerly Assoc. Entomologist, Experiment Station, Baton Rouge, La. (*Orange.*)

*TUCKER, GILBERT M. (*J. J. Thomas, Luther Tucker.*)

TURNER, WILLIAM, Gardener, Supt. to B. H. Borden, Oceanic, N. J. (*Forcing.*)

TURNEY, A. G., Horticulturist, Dept. of Agriculture, Fredericton, N. B. (*New Brunswick, F. S. Sharp.*)

*UNDERWOOD, L. M. (*Many genera of ferns.*)

‡VAN DEMAN, H. E., Pomologist, Washington, D. C. (*Nut-culture.*)

VAN FLEET, W., Physiologist, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Perfumery-Gardening.*)

VAUGHAN, J. C., Seedsman, 31-33 W. Randolph St., Chicago, Ill. (*Christmas Greens.*)

VERBECK, WILLIAM, President and Head Master of St. John's School, Manlius, N. Y. (*Japanese Gardening.*)

VINCENT, C. C., Prof. of Horticulture, College of Agriculture, Moscow, Idaho. (*Idaho.*)

VITALE, FERRUCCIO, Landscape Architect, 527 Fifth Ave., New York City. (*Formal Gardens.*)

WAID, C. W., Extension Specialist in Vegetables, Michigan Agricultural College, East Lansing, Mich. (*Forcing, Greenhouse.*)

WALDRON, C. B., Prof. of Horticulture and Forestry, Dean of Agriculture, Agricultural College, N. D. (*North Dakota.*)

‡WALKER, ERNEST, formerly Prof. of Horticulture, Alabama Polytechnic Institute, State Horticulturist, Auburn. Late of Bolling Farms, Bolling, Ala. (*Arkansas, Watering.*)

*WARD, C. W., (*Pelargoniums.*)

*WARDER, R. H. (*J. A. Warder.*)

WARNER, MARJORIE F., Bibliographer, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Aid on book-list.*)

WARREN, G. F., Prof. of Farm Management, New York State College of Agriculture, Ithaca, N. Y. (*Cost-Accounting.*)

WATROUS, C. L., Nurseryman, Des Moines, Iowa. (*Arboriculture, Iowa.*)

WATSON, B. M., Late Instr. in Horticulture, Harvard University (Retired), Plymouth, Mass. (*Colchicum, Cuttings, Forcing, House Plants, Winter Protection, Rose, Rhododendron.*)

WATTS, RALPH L., Dean and Director of the School of Agriculture and Experiment Station, State College, Pa. (*Celery, G. C. Butz, Gabriel Hiester, Tomato.*)

WAUGH, F. A., Head of Division of Horticulture and Prof. of Landscape Gardening, Massachusetts Agricultural College, Amherst, Mass. (*Many vegetables, Landscape Gardening, Village Improvement, Plum.*)

WEBB, WESLEY, Sec. Peninsula Horticultural Society, Dover, Del. (*J. G. Brown.*)

WEBBER, H. J., Dir. Citrus Experiment Station, University of California, Riverside, Calif. (*Breeding, Casimiroa.*)

WESTER, P. J., Horticulturist, Bureau of Agriculture, Manila, P. I. (*Philippine Islands.*)

WHEELER, H. J., Manager Agricultural Service Bureau of the American Agricultural Chemical Co., Boston, Mass. (*Fertilizers, Lime.*)

WHEELER, WILFRID, Sec. Massachusetts Board of Agriculture, Boston, Mass. (*Strawberry.*)

WHETZEL, H. H., Prof. of Plant Pathology, New York State College of Agriculture, Ithaca, N. Y. (*Diseases, Fungi, Root-Galls.*)

WHIPPLE, O. B., Prof. of Horticulture, State College of Agriculture, Bozeman, Mont. (*Apple.*)

WHITE, E. A., Prof. of Floriculture, New York State College of Agriculture, Ithaca, N. Y. (*Design, Floriculture, Mignonette, Primula.*)

WHITE, ELIZABETH C., Grower of Cranberries and Blueberries, New Lisbon, N. J. (*Cranberry.*)

*WHITNEY, MILTON. (*Irrigation, Soils.*)

WHITTEN, J. C., Prof. of Horticulture and Horticulturist to the Experiment Station, University of Missouri, Columbia, Mo. (*Extension Teaching, Missouri, several biographies.*)

WICKSON, E. J., Prof. of Horticulture, Emeritus, College of Agriculture, University of California, Berkeley, Calif. (*Articles on many of the fruits and vegetables in California.*)

WIEGAND, K. M., Prof. of Botany, New York State College of Agriculture, Ithaca, N. Y. (*Synopsis of Families, Bidens, Cordyline, Flower, and several genera.*)

WIGHT, W. F., Botanist, Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Solanum.*)

‡WILLIAMS, P. F., Horticulturist of Experiment Station, Auburn, Ala. (*W. F. Heikes, Alabama.*)

WILLING, T. N., Prof. of Natural History, University of Saskatchewan, Saskatoon, Sask. (*Saskatchewan.*)

WILLIS, E. R. B., Reference Librarian, Cornell University Library, Ithaca, N. Y. (*Much help on the Name-list.*)

WILSON, C. P., Station Sec. and Editor Agricultural Publications, State College, New Mex. (*Nut-Culture in New Mexico.*)

WILSON, C. S., State Commissioner of Agriculture, Albany, N. Y. (*Apricot, Cover-Crops. Spraying, Exhibitions.*)

WILSON, WILFORD M., Prof. of Meteorology, New York State College of Agriculture, Ithaca, N. Y. (*Frost.*)

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WINSLOW, R. M., Provincial Horticulturist and Inspector of Fruit Pests, Dept. of Agriculture, Victoria, B. C. (*British Columbia.*)

WOODBURY, C. G., Prof. of Horticulture, Purdue University, LaFayette, Ind. (*W. H. Ragan.*)

WOODS, ALBERT F., Dean Colleges of Agriculture and Forestry and Dir. of Experiment Stations, University of Minnesota, University Farm, St. Paul, Minn. (*Variegation.*)

WOOLVERTON, LINUS, Fruit-Grower, Grimsby, Ont. (*Many biographical sketches.*)

WORK, PAUL, Instr. in Vegetable-Gardening, New York State College of Agriculture, Ithaca, N. Y. (*Irrigation, Kitchen-Garden, Vegetable-Gardening.*)

WRIGHT, J. HARRISON, Fruit-Grower, Riverside, Calif. (*Help on palms.*)

*WYMAN, A. PHELPS. (*Many genera of trees and shrubs.*)

YOUNG, ROBERT A., Botanical Asst., Bur. of Plant Ind., U. S. Dept. of Agric., Washington, D. C. (*Taro, Xanthosoma, Yam.*)

ZVOLANEK, ANT. C., Seed-grower, Lompoc, Calif. (*Sweet Pea in California.*)

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CULTIVATOR'S GUIDE TO THE ARTICLES

The numerals refer to pages when the articles are not in the regular alphabetic sequence

The articles in the Cyclopedia are of four general classes: (1) cultural directions for the gardener, fruit-grower, vegetable-gardener, florist, and home planter; (2) identification, comprising the botanical accounts of genera, species and varieties; (3) general information about plants, comprising much of the introductory material in Vol. I and articles in the alphabetic text as Autumn Colors, Bull Horn, Color, Standards of Color, Cactus, Cloves, Education, Experiment Stations, Extension Teaching, Gums and Resins, Herbarium, Horticulturists, Horticultural Literature, Names and Nomenclature, Sap, Saprophyte, Transpiration, Variegation, Xenia, and many others; (4) geographical articles, comprising British North America, Island Dependencies, North American States.

The identificational and informational articles appear, for the most part, in regular alphabetic order. The cultural directions, however, are in part contained in class articles of many kinds, inasmuch as they have only indefinite alphabetic designation. With each important generic entry, cultural directions will be found, as under Wisteria, Rhamnus, Ardisia, Pyrola, Ixora, Torenia, and the others throughout the six volumes; aside from these directions, however, are many others of special importance and interest, and these others are here listed and classified in such a way that the cultivator may have the range before him and be aided in finding the advice he desires.

1. Leading or important class articles of a cultural or plant-handling character.

Some of the leading class articles, dealing with the cultivation and handling of plants and products and with arrangement of plant materials, are as follows:

Alpine plants.
Annuals.
Ants.
Aquarium.
Aquatics.
Arboretum.
Arboriculture (symposium), comprising contributed parts on uses, insects and diseases, culture, transplanting, lists.
Autumn-gardening.
Bamboos.
Banks.
Basket plants.
Bedding, or bedding-out.
Bees.
Biennials.
Birds.
Bog-gardening; also page 2666.
Border.
Botanic garden.
Bouquet.
Breeding of plants.
Bulbs.
Conifers; also page 358.
Conservatory.
Culinary herbs.
Cut-flower industry.
Cuttings.
Design, floral.
Diseases and insects (symposium), comprising extensive lists, also fungicides, insecticides, spraying.
Drainage.
Dwarfing.
Electro-horticulture.
Etherization.
Evaporating fruit.
Evergreens.
Everlastings.
Exhibitions (symposium).
Ferns (symposium), with lists and culture.
Fertility.
Fertilisers.
Floral designs: see Designs, floral.
Floriculture.
Florists' plants.
Flower-garden: see Kitchen-garden and flower-garden.
Forcing.
Forestry.
Formal-gardening: see under Landscape gardening, 1793.
Frost.
Fruit-growing.
Fumigation: see under Diseases and insects, 1044.
Fungi.
Grafting.
Grasses.
Greenhouse and management (symposium).
Hedges.
Herbs (symposium), with lists.
Horticulture.
Hotbeds and coldframes.
House plants.
Insects: see under Diseases and insects.
Inspection of horticultural merchandise.
Irrigation, including sub-irrigation.
Japanese gardens: see under Landscape gardening, 1789.
Kitchen-garden and flower-garden (symposium).
Labels.
Landscape gardening (symposium), including formal gardens, cemeteries, parks, lawn-making, and other parts.
Lawns: see under Landscape gardening, 1816.
Lawn planting: see under Landscape gardening, Herbs, Planting, Arboriculture (see List No. 9, page 3564).
Layers.
Light for greenhouses.
Lists of trees (under Arboriculture), herbs (Herb, Herbs), shrubs (Planting); also under Ferns, Orchids, Palms.
Machinery and implements (symposium).
Manure.
Market-gardening.
Marketing.
Muckland-gardening.
Mushroom.
Nursery.
Nut-culture.
Nuts.
Orchids (symposium), comprising different parts; see also the culture under the alphabetic orchid entries.
Orchard: see Fruit-growing.
Packages.
Palms (symposium), comprising different phases of botany and treatment, with list of leading palms and their culture.
Park: see under Landscape gardening, 1801; also 2694.
Perennials.
Perfumery-gardening.
Pergolas.
Planting (symposium), comprising more than twenty articles on special phases of the work, with lists of shrubs.
Pollen, Pollination.
Potting.
Pruning.
Railroad-gardening.
Rock-gardening.
Rustic work: see under Planting, 2677.
Screens: see under Planting, 2681.
Seaside planting: see under Planting, 2670.
Seeds and seedage (symposium).
Shade-loving plants: see under Planting, 2695; 2700; under Herbs, 1467, 1472, 1473, 1475.
Shade trees: see under Arboriculture.
Shrubbery: see under Planting.
Small-fruits: see the separate articles, as Blackberry, Blueberry, Buffalo berry, Currant, Dewberry, Gooseberry, Raspberry; also Fruit-growing.
Spring-gardening.
Storage.
Subtropical gardening: see under planting, 2669.
Succulents: see under Planting, 2672.
Sun-loving plants: see under Planting, 2701; under Herbs, 1471, 1472, 1473, 1476.
Tools and implements: see Machinery and implements.
Topiary work: see under Planting, 2675.
Transplanting; also under Arboriculture, 362.
Transportation.
Tree-moving: see under Arboriculture, 362.
Vegetable-gardening.
Village improvement: see under Planting, 2658.
Vines: see under Planting, 2681, 2682, 2695, 2697–2700, 2705.
Wall-gardening: see under Planting, 2680.
Walks, paths and driveways.
Water-gardening: see under Planting, 2668; also Bog-gardening, 519 and 2666; Aquarium; Aquatics; Nymphæa, Victoria, and others.
Watering.
Wild-garden: see under Planting, 2663.
Windbreak.
Window-gardening and window-boxes.
Winter-gardening: see under Planting, 2677.
Winter protection: see under Planting, 2684.
Woods: see under Planting, 2662; also Landscape gardening.
Also articles on the different fruits, flowers, vegetables, trees, shrubs, ornamental plants, in regular alphabetic order.

2. Soil management; fertilizing; cover-crops.

Soils.
Tillage.
Tillage machinery, 1942.
Drainage.
Mulching.
Irrigation.

Manure.
Fertilizers.
Lime, in horticulture.
Compost.
Peat.

Cover-crops.
Legumes.
Clover, Trifolium.
Cowpea.
Soybean.
Velvet bean (Stizolobium), 3243.
Spurry.
Rape.

3. Insects, diseases, birds, weeds; frost; means of control.

Ants.
Insects, 1034.
Bees.
Insect injury to trees, 364.
Mites, 1041.
Nematodes, 1041.
Sowbugs.
Rose insects, 3018.

Diseases.
Diseases of trees, 368
Rose diseases, 3019.
Fungi.
Damping-off.
Mildew.
Molds.
Pæonia diseases, 2433.
Root-galls.
Rusts.
Smut.

Birds.
Frost.
Orchard protection against frost, 1284.
Weeds.
Insecticides, 1042.
Fungicides, 1027.
Fumigation, 1044.
Spraying, 1057.
Spraying machinery and tools, 1956.

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4. Propagation; breeding.

Seeds and seedage.
Cuttings.
Grafting.
Budding, 1364.
Inarching, 1370.
Layers, propagation by, 1831.
Piceas, grafting.
Roses, prop., 3004.
Rhododendron, prop., 2933.
Nursery.

Breeding.
Breeding, by seeds, 3134.
Hybridisation, 552.
Pollination, 2734.
Dwarfing.

5. Marketing; transportation; inspection; exhibitions.

Marketing of horticultural produce.
Packages.
Storage.
Cold-storage.
Transportation.
Inspection.
Quarantine laws, 1650.
Exhibitions; of plants and flowers, 1190; of fruits, 1191; of vegetables, 1193.

6. Gardening; greenhouse; floriculture; florists' plants; flower-growing. (See List No. 9, on Landscape Gardening, etc.)

Autumn-gardening.
Basket plants.
Bedding.
Bog-gardening; also 2666.
Border.
Bouquet.
Flower-garden, 1747.
House plants.
Perfumery-gardening.
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ADDITIONAL SPECIES

The first volume of this Cyclopedia was published in March, 1914. The lists of plants on which it was founded were brought down to the close of 1912, and it was to this date, as stated on page xi, that the Cyclopedia undertook to cover its task, although subsequent introductions have been inserted up to the closing of the pages so far as possible and as the information has come to hand. Undoubtedly some names were overlooked. Four years and more have passed since the original lists were prepared, and cross-referenced back and forth throughout the letters of the alphabet. Within this time, species have been introduced to cultivation within the United States and Canada, and which may now be described. The present list is not complete for the subtropical parts, and probably not all the introductions have been discovered for the other parts. The commerce in plants is incessant, and the situation is never at rest.

The consultant will probably be disappointed in not finding some of the well-advertised binomials in either the body of the Cyclopedia or this Supplement. The Editor has a long list of such names, but, without the plants themselves before him, he cannot know what the names mean. They are such as have no botanical standing, and the descriptions in the catalogues do not identify them. Probably some of these binomials represent generic and varietal names, with the species-name omitted. This is a prevalent but very faulty practice, as it obscures all relationships and plunges the subject into confusion. So long as this practice prevails, it is impossible to make clear identification of cultivated plants.

Only in one group does there appear to have been any marked extension of species, and this is in the willows (Salix). Some of the very attractive Chinese and other willows are very recently offered, and the account of that genus is therefore much extended. The additions in the willows are made by Alfred Rehder, as are also the additions and modifications in all the articles originally prepared by him.

ÀBIES. Page 172.

Delavàyi, Franch. (*Keteleèria Fàbri,* Mast.). (After No. 11 in the treatment of Abies.) Tall tree, to 120 ft.: young branches yellowish or reddish brown, lustrous, usually glabrous: winter buds obtuse, resinous: lvs. spreading, crowded, usually blunt and emarginate, strongly recurved at the margins, silvery white below, ½–1 in. long: cones oblong-ovate to oblong-cylindric, usually truncate, deep violet, about 2½ in. long; bracts usually slightly exserted. W. China. G.C. III. 39:212 (as *A. Fargesii* on p. 213).

Faxoniàna, Rehd. & Wilson. (After No. 11.) Tall tree, to 120 ft.: young branches brownish villous: winter buds obtuse, very resinous: lvs. crowded, distichously spreading, linear, short-pointed or obtuse to emarginate, ½–1 in. long, silvery white beneath: cones ovoid or ovoid-oblong, usually truncate violet-purple, about 2½ in. long; bracts exserted. W. China.

recurvàta, Mast. (After No. 11.) Tall tree, to 120 ft.: young branches pale yellowish gray, lustrous, glabrous: winter bud slightly pointed, very resinous: lvs. crowded, spreading or recurved, sometimes falcate, pointed, bright green or glaucescent, of about the same color on both sides, about ½in. on fruiting branches, about 1 in. long and more pointed on young plants: cones oblong-ovoid, usually flattened at the apex, violet-purple before maturity, later gray-brown, about 3 in. long; bracts not exserted. W. China.

squamàta, Mast. (After No. 11.) Tall tree, to 120 ft.; bark purplish brown, exfoliating in thin flakes like the river birch: young branches brown, glabrous: winter buds obtuse, very resinous: lvs. very crowded, ascending, mucronate or obtuse, often falcate, glaucous below while young, becoming nearly green, ½–1 in. long: cones oblong-ovoid, obtuse, violet, 2–3 in. long; bracts slightly exserted. W. China. G.C. III. 39:299. —Very remarkable for its bright purplish brown bark, scaling off in thin flakes. It has violet-purple resinous cones, and short relatively broad leaves.

ALEURÌTES. Page 245.

montàna, Wilson, is a new wood-oil tree recently intro. from China, and related to *A. Fordii,* but with the staminate and pistillate fls. tending to be in separate infl., the latter racemose and the fr. egg-shaped with 3 longitudinal and many transverse ridges.

AMPELÓPSIS. Page 278.

Watsoniàna, Wilson (*Vitis leeoides,* Veitch, not Planch.). (After No. 10.) Tall climbing shrub, with slender forked tendrils, glabrous: lvs. simply pinnate; lfts. 5, stalked, ovate to ovate-oblong, acuminate, rounded at the base, remotely serrate, bright green above, glaucescent beneath, 3–4½ in. long: fls. and frs. not known, but probably not much different from those of *A. leeoides* to which this species is closely related, but easily distinguished by the always simply pinnate lvs. with fewer and larger lfts. Cent. China. J.H.S. 28:295, figs. 95, 96, erroneously cited under *A. leeoides* on p. 278 of this work.

ANGÓPHORA. Page 288.

intermèdia, DC. (*Metrosidèros floribúnda,* Smith, not Hort.). Tree, described by Bentham as having rough persistent fibrous bark, the parts nearly or quite glabrous: lvs. lanceolate to ovate-lanceolate, distinctly stalked, 2–4 in. or more long, sharply acuminate: fls. rather small, in loose corymbs or trichotomous panicles; calyx about 2 lines long or longer, with 5 prominent ribs, the teeth short-subulate. Austral.—In Calif. said to be a very fine drought-resisting shade and avenue tree.

lanceolàta, Cav. Described in Calif. as a medium-sized white-fld. tree; by Bentham said to be "a tree of considerable size," with bark deciduous in large smooth flakes, the parts glabrous or essentially so: lvs. lanceolate, acuminate, 3–5 in. long, distinctly petiolate, with numerous parallel pinnate veins: fls. in rather dense terminal clusters, larger and denser than in *A. intermedia;* calyx about 3 lines long, the teeth shorter and thicker than in *A. intermedia.* Austral.

AQUILÈGIA. Page 339.

akitènsis, Huth. St. erect, branched above: radical and lower cauline lvs. twice ternate, uppermost cauline lvs. simple, narrowly lanceolate: sepals oval, longer than the limb of the petals, pale purple when dry; petals with a rather straight spur, limb subtruncate, pale yellow. Japan; intro. as an alpine species, with blue-and-yellow fls.; the author of species does not state its relationships.

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ARGRYRÈIA. Page 391.

spléndens, Sweet (*Convólvulus spléndens*, Hornem. *Lettsòmia spléndens*, Roxbg. *Ipomœa spléndens*, Sims). Described by Clarke as "a large climber:" lvs. elliptic and acuminate, never cordate but the base rhomboid or rounded, blade about 7 in. long and petiole 3 in., glabrous above and silky beneath: fls. rose-colored or pale red, in few- or many-fld. pedunculate corymbs; corolla tubular-campanulate, 1½ in. long, the plaits hairy outside; sepals tomentose, ovate and obtuse, ¼in. long: caps. scarlet, papery. India. B.M. 2628.—Doubtful whether known in this country. The plant in cult. as *Convolvulus splendens* may be a form of the common morning-glory, *Ipomœa purpurea*.

BÉRBERIS. Page 487.

Regelìana, No. 2, Fig. 539, represents *B. amurensis* rather than *B. Regeliana*, which is probably better considered a variety of *B. amurensis*, and to be called **B. amurénsis** var. **japónica,** Rehd.

lèvis, No. 24. The species described under this name is **B. atrocárpa,** Schneid. (*B. lèvis*, Hort., not Franchet). The true *B. levis* is not in cult.; it has more closely serrated lvs. and purplish black slightly bloomy fr., while the fr. of *B. atrocarpa* is jet-black.

Sargentiàna, No. 25. The plant described is the true species, but the shrub cult. under this name is often **B. Julianæ,** Schneid., which seems slightly hardier; it has the young branches yellowish and slightly grooved (terete and red while young in *B. Sargentiana*), shorter lvs. hardly exceeding 2½ in., firmer and less reticulate beneath, elliptic bloomy frs. crowned by a short style, on pedicels ¼–½in. long.

B. aggregata, Suppl. List. (page 492). Add as a synonym *B. brevipaniculata*, Hort., not Schneid.; the true *B. brevipaniculata* is not in cult.

B. Wallichiana, Suppl. List. The species cult. under this name and described here is *B. xanthoxylon*, Hassk., to which *B. Wallichiana* var. *latifolia*, Hort., and also *B. Knightii*, Hort., *B. macrophylla*, Hort., and *B. Wallichiana*, Hort., not DC., must be referred as synonyms. The true *B. Wallichiana*, DC., has elliptic lvs. of firmer texture and is not in cult., while the true *B. Wallichiana* var. *latifolia*, Hook f. & Thoms., belongs as a synonym of *B. Hookeri*, Lem.

BÉTULA. Page 497.

Var. **Prâttii,** Burkill. (End of No. 3, *B. utilis*.) Lvs. nearly truncate at the base, more gradually acuminate, the secondary veins scarcely pilose, but the veinlets short-pubescent: scales of the catkins with very short lateral lobes. W. China.

álbo-sinénsis, Burkill (*B. ùtilis* var. *sinénsis*, Winkler). (After No. 3.) Tree, occasionally to 100 ft., with orange-red bark: branchlets glabrous, lustrous: lvs. ovate, acuminate, rounded at the base, sharply and doubly serrate, glabrescent beneath, with 9–10 pairs of veins, 1½–3 in. long: cones cylindric, 1½–1¾ in. long; bracts glabrous, scarcely ciliate, slightly glandular; lateral lobes rounded, much shorter than the linear-lanceolate middle one. Cent. and W. China. Var. **septentrionàlis,** Schneid. Branchlets distinctly glandular: lvs. beneath on the veins often silky and bearded. N. W. China.

Potanínii, Batal. (*B. Wilsonii*, Bean). (After No. 7.) Shrub, to 10 ft., usually with spreading and prostrate branches, in its native habitat often hanging down over cliffs: branchlets densely brownish pubescent: lvs. short-petioled, ovate, acute, rounded or cuneate at base, irregularly, often doubly serrate, with 13–20 pairs of veins, dark green above, densely brownish pubescent beneath, ¾–1¾ in. long: cones ¾in. long: scales with the middle lobe at least twice as long as the rounded lateral lobes. W. China.

In *B. pendula*, No. 9, strike out var. *Tauschii* and its description and insert after the end of the paragraph:

japónica, Sieb. (*B. álba* var. *japónica*, Miq. *B. péndula* var. *Taùschii*, Rehd.). Tree: branchlets glabrous or more or less glandular: lvs. broadly or deltoid-ovate, acuminate, truncate or broadly cuneate, sometimes subcordate at the base, simply or doubly serrate, glabrous or puberulous beneath and sometimes bearded in the axils, 2–3 in. long: cone cylindric, its stalk ¼–½ in. long; scales with the lateral lobes spreading or recurved, as long or longer than the middle one. Japan. S.I.F. 1:21. Var. **szechuánica,** Schneid. (var. *mandschùrica*, Schneid., not Winkler). Tree with wide-spreading branches: lvs. rounded or broadly cuneate at the base, glabrous or nearly so, dull or bluish green above: lateral lobes of scales spreading, half as long as the lanceolate middle one. W. China.

BUDDLÈIA. Page 585.

Fárquharii, L. Barron (*B. asiática* × *B. officinàlis*). (After No. 5.) Intermediate between the parents. Lvs. lanceolate, 4–6 in. long, white or yellowish white beneath: fls. pale mauve, fragrant, in slender spikes forming large terminal panicles to 1 ft. long; the spikes composed of stalked, 3–7-fld. clusters. Raised by R. & J. Farquhar & Co., Boston, in 1913. Gn.M. 21:155.

CALLISTÈMON. Page 630.

Other names, than those described in Vol. II are listed in California, but their botanical standing is in doubt. The best that can be done at present is to make the following statements:

coccíneus, Muell. Similar to *C. lanceolatus* but lvs. smaller, 1–1½ in. long, pungently acute; midrib and nerve-like margins prominent but lateral veins inconspicuous: stamens ¾–1 in. long, red, with yellow anthers: fr. strongly contracted at summit. Austral.

Cúnninghamii, Koch. Listed in Calif.: "Lvs. extremely narrow. Growth low and compact." Botanically described as follows: Lvs. elliptical, wide-spreading, pale green, pellucid or sometimes roughish, marginal nerves and veins rather prominent, young lvs. reddish, somewhat silky: stamens scarcely 3 times longer than the petals. Austral.

floribúndus péndulus. A trade name used in Calif. for an unknown form recently intro. from European gardens. Described as of compact growth with short slender drooping branches well covered with short broad and rather blunt lvs. Probably a form of *C lanceolatus*.

hýbridus, DC. Described only from lvs. which are rigid, linear, almost pungent, and with marginal nerve. —Not recognized by recent authors. The plant offered in Calif. under this name is probably a garden hybrid from Eu.

C. robústus, and **C. spléndens** are trade names used in Calif. for forms recently intro. from Eu. Their botanical status is unknown.

HARVEY MONROE HALL.

CÁSSIA. Page 680.

polyántha, Moc. & Sessé. Branches angled: lvs. about 12-paired, glabrous, spreading; lfts. petiolulate, 4 lines long, oval, mucronate: fls. paniculately subcorymbose, 9 lines diam.; calyx-segms. broadly ovate, mucronate; petals unguiculate, obovate: pod compressed, acute at both ends, 2 in. long, 6 lines broad. Mex.—In Calif. said to be a spreading shrub blooming freely and continuously; yellow.

CÉLSIA. Page 709.

Arctûrus, Jacq. Probably perennial, but sometimes perhaps annual or biennial, differing from *C. cretica*, among other things, in its long-pedicelled rather than

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subsessile fls.: more or less woolly, especially below: lvs. all alternate, canescent beneath, short-petioled, lyrate, the terminal segm. large and oblong-obtuse with crenate margins, the later segms. smaller and ovate; cauline lvs. few, oblong and slightly clasping: fls. verbascum-like, yellow, the five spreading lobes obtuse, purple-hairy stamens deflexed and ascending. Crete. B.M. 1962.

CENTAURÈA. Page 712.

orientàlis, Linn. (After No. 9.) Perennial, 3 ft., erect and branching, the branches sparsely cobwebby: lvs. coriaceous, glabrous or roughish, pinnatisect into lanceolate or linear divisions: heads yellow-fld. (said to be a red-fld. form), large, ovate; bracts of involucre pale or colored at tip, the intermediate or outer ones ovate and prominently pectinate. Caucasus region.—A handsome species, with long-stalked heads. Centaurea is a large genus, with many ornamental species, and other kinds than those described in the Cyclopedia are likely to come into the trade from time to time as flower-garden and border subjects.

CHÆNOMÈLES. Page 727.

japónica. It has been shown recently that Thunberg, when describing his *Pyrus japonica*, had the species now called *C. Maulei* in mind: therefore the name **C. japonica,** Lindl., must replace the name *C. Maulei*, and the species called here *C. japonica* must bear the name **C. lagenària,** Koidzumi (*Cydònia lagenària* Loisel.); and *C. cathayensis* should be a variety of it: Var. **cathayénsis,** Rehd. (*C. cathayénsis*, Schneid.). Lvs. narrower, lanceolate, pubescent beneath while young. Cent. China. H.T. 27:2657, 2658. Another variety is: Var. **Wilsonii,** Rehd. Lvs. covered beneath with a persistent fulvous woolly tomentum. W. China.

C. Maulei, Schneid., becomes **C. japonica,** Lindl.

CLÉMATIS. Page 787.

No. 14, *C. nutans*. Var. *thyrsoidea* is now considered a distinct species and has been named:

C. Rehderiàna, Craib (*C. nùtans* var. *thyrsoidea*, Rehd. & Wilson).

No. 28, *C. montana*, add: forma **platysépala,** Rehd. & Wilson. A form of *C. montana* var. *Wilsonii* with broadly obovate, rounded or truncate sepals: the fls. are very round in shape and appear at the same time as the lvs.

C. Gouriana in the Suppl. List (page 798), add: Var. *Finétii*, Rehd. & Wilson. Achenes glabrous, orbicular-ovoid and compressed, dark brown.

CÒCOS. Page 812.

schizophýlla, Mart. Trunk, 6–9 ft. high: lvs. 6–9 ft. long; segms. 30–40, linear, acuminate, 12–16 in. long: spadix up to 3 ft. long: drupe orange-red. Brazil.—Described as a strong-growing species, useful for planting out in Fla. and Calif.

CÓRNUS. Page 851.

Wílteri, Wang. (After No. 13.) Tree, to 40 ft.: branchlets nearly glabrous: lvs. elliptic, acuminate, broadly cuneate at the base, sometimes nearly rounded, usually crisped at the margin, dark green above, pale green and with appressed hairs beneath, with usually 4 pairs of veins, 2–4 in. long: panicle corymbose, about 3 in. across; style club-shaped: fr. black, about ¼in. across. Cent. China.—This plant has been confused with *C. Wilsoniana* which is apparently not in cult. and is chiefly distinguished by the whitish under side of the lvs. and the cylindric style.

Hémsleyi, Schneid. & Wang. (After No. 14.) Shrub, to 20 ft.: branchlets appressed-pubescent at first, becoming glabrous and reddish brown or purple: lvs. ovate to ovate-elliptic, short-acuminate, rounded at the base, with 6–7 pairs of veins, whitish and appressed pubescent beneath, often with brownish hairs along the midrib and veins, 2–3 in. long: corymb umbel-like, 2–3 in. broad, slightly pubescent or with brownish woolly hairs; style cylindric: fr. ½in. across, bluish black. W. China.

CRATÆGUS. Page 878.

coloradénsis, A. Nels. (After No. 35.) Low tree, to 12 ft., with glossy brown, sparingly spiny branches: lvs. broadly oval to orbicular, acute, rounded or somewhat cuneate at the base, incisely and coarsely toothed, sparingly pubescent above, nearly glabrous beneath except pubescent on the midrib and veins, about 2 in. long; petioles rather short: corymbs many-fld.; pedicels and calyx-tube hirsute; stamens 10; styles usually 3: fr. subglobose, about ½in. across, dark scarlet, with juicy pulp. Colo.

erythrópoda, Ashe (*C. cerrònis*, A. Nels.). (After No. 35.) Small tree, to 15 ft.: branchlets glabrous, purplish brown, spiny: lvs. elliptic-ovate or obovate, acute, abruptly narrowed at the base, incisely serrate and slightly lobed above the middle, lustrous and sparingly pubescent above, particularly on the veins, glabrous below, 1½–2½ in. long: corymb glabrous; stamens 5–8, with purple anthers: fr. subglobose, ½in. across, brown. Colo.

salígna, Greene. (After No. 37.) Tree, to 20 ft., with spreading or drooping branches, spiny; branchlets bright red, glabrous: lvs. rhombic-elliptic to rhombic-lanceolate, acute or sometimes rounded at the apex, cuneate at the base, slightly hairy and dark green above, paler green and glabrous beneath, 1¾–2 in. long: corymbs glabrous: fls. ⅔in. across; stamens 20, anthers yellow: fr. globose, blue-black, ½in. across, with 3–5 nutlets. Colo. S.M. 491. B.B. 482.

CÙPHEA. Page 913.

jorullénsis, HBK. (*C. tricolor*, Moc. & Sessé. *C. arvénsis*, Benth.). Herb; branches compressed, viscous-pubescent; lvs. oblong-lanceolate, 2 in. long, ¾in. broad, acute, base rotundate, both surfaces scabrous: peduncles solitary to ternate, alternate: calyx viscid-pubescent, tubular, ventricose below. Mex.—*C. jorullensis*, Hook. B. M. 5232=*C. micropetala*.

Hookeriàna, Walp. (*C. floribúnda*, Hook. & Arn., not Lehm. *C. Roèzlii*, Carr.). Shrubby; branches elongate scabrous; lvs. oblong-lanceolate, acuminate, base attenuate to a rather long petiole, both surfaces somewhat shining, scabrous: calyx deflex-bowed, base obtusely, viscous-pubescent, spurred. Mex.

CYNOGLÓSSUM. Page 939.

nervòsum, Benth. Plant hairy-pubescent, to 3 ft., perennial: lvs. many, nearly sessile, elliptic or oblong, acute, those on the st. 4 in. long and not prominently nerved, the radical ones narrow-oblanceolate and with several pairs of strong nerves: fls. deep cobalt-blue, about ½in. across, in many lax axillary and terminal racemes which are 3–6 in. long; corolla broadly campanulate with a short tube. Himalayan region. B.M. 7513, where it is said to be "the largest-flowered Himalayan Cynoglossum, and a very handsome plant."

CYPÈRUS. Page 940.

adenóphorus, Schrad. About 2 ft. high: culm glabrous: lvs. shorter than the culm, linear, carinate: umbel 9–14-rayed; umbellules 6–9-rayed; rays 10–20-spiked; spikelets linear-lanceolate, many-fld., 3 lines long, the infl. whitish green: fr. obovate, 3-angled punctate-scabrous. Brazil.—Useful for pots.

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DÆMÓNOROPS. Page 951.

fissus, Blume. Lf.-segms. many and graceful, 6–8 in. long, lanceolate, subulate-acuminate, plicate, apex penicillate, often bifid; rachis aculeate: spadix erect, contracted: fr. ovoid-globose, about the size of a small cherry. Borneo.—Foliage described as bronzy green.

DECKÈNIA (after Karl von der Decken, German explorer of East Africa, killed in 1864 by the Somalis). Sometimes misspelled *Deckeria:* but there is a genus name Deckeria which, however, is regarded as a synonym of Iriartea. *Palmaceæ.* One species, by some referred to Acanthophœnix, from the Seychelles, now intro. as a warmhouse palm. **D. nóbilis,** Wendl., is a tall palm, reaching 100 ft. and more, and 1 ft. or more in diam.: lvs. pinnate, 10–12 ft. or more long, the sheath 3–6 ft. long and usually spiny; petiole about 1 ft. long, pale green and smooth; pinnæ narrow, hairy beneath, bristly when young; midrib yellow: fls. monœcious, in 3's, the middle one female, the male with 9 stamens and minute perianth, the female with imbricate perianth: spadix with slender pendulous branches which are spiny at the base; spathes 2, spiny, seldom exceeding 1 ft.: fr. much compressed, ovoid-deltoid, ½in. long and ⅙in. thick, black turning to straw-colored.

DELPHÍNIUM. Page 975.

speciòsum. The trade name may apply to a showy garden form of undetermined origin. *D. speciosum,* Bieb., to which the botanical name applies, is a tall gray-tomentose perennial of the Caucasus: st. angled, paniculate above: lvs. palmately parted, the segms. acute and cut, the lower segms. not divergent: spur incurved at the point, equaling the sepals; petals glabrous above; ovary tomentose. Caucasus region, Persia.—*D. speciosum glabratum* is said by Nicholson to be similar in growth and fls. to *D. cashmirianum,* but has larger infl. and the fls. have longer spurs; Himalaya.

DIÁNTHUS. Page 997.

marginàtus. The trade name may represent a marginate or edged form of one of the common annual garden pinks; if *D. marginatus,* Poir., it is a perennial of Europe, with linear marginate lvs. and solitary white fls.; calycine scales or bracts acute and shorter than the calyx.

ÉLYMUS. Page 1111.

gigantèus, Vahl. Giant Siberian Rye-Grass. A tall species resembling *E. condensatus:* spike 1 ft. or more long; glumes narrow below, subulate above, longer than the several florets; lemmas pubescent, awnless. Siberia.—Sometimes cult. as an ornamental.

EREMÙRUS. Page 1128.

turkestánicus, Regel. Plant about 4 ft. high, with very long and dense terminal raceme of reddish brown fls. with long-exserted stamens and white-margined perianth-segms.: lvs. broadly linear, acuminate. Turkestan.

EUCALÝPTUS. Page 1152.

álba, Reinw. (*E. platyphýlla,* F. v. M.). Related to *E. populifolia,* but lvs. much more variable, from lanceolate to broadly ovate or almost orbicular, acute to cordate at base, mostly 3 in. long: umbels in the axils and paniculate, 3–7-fld., pedicels short or almost none, angular: cap hemispherical, low: valves slightly protruding. Austral. Maiden, Crit. Rev. Eucal. 105, 106, 107.—Grown at Los Angeles.

EUPATÒRIUM. Page 1166, after No. 22 (but lvs. stalked).

serótinum, Michx. An attractive species, 4–8 ft. high, with grayish white numerous fls. in a broad cymose infl.: branching, pubescent at least above: lvs. ovate-lanceolate, long-acuminate, 3-nerved, slender-petioled, sharp-serrate, the upper ones alternate: fls. 7–15 in the campanulate involucre, of which the bracts are obtuse or truncate. Minn., south and southeast.

EVÒDIA. Page 1185.

hupehénsis, Dode. (After *E. Henryi.*) Tree, to 60 ft.: lfts. 7–9, short-stalked, elliptic-ovate to elliptic-lanceolate, long-acuminate, rounded or rarely narrowed at the base, glaucescent or pale green beneath and glabrous or nearly so except villous in the axils of the veins, 3–6 in. long: infl. slightly pubescent, 4–8 in. broad: fr. beaked, yellowish gray, slightly hairy. Cent. China.

FÌCUS. Page 1229.

ulmifòlia, Lam. (*F. sinuòsa,* Miq.). Shrub, 9–15 ft. high: lvs. alternate, variable, very harsh, oblong, subentire, undulately lobed or coarsely toothed, sometimes deeply and narrowly lobed, acuminate, base rounded, 3-nerved, 3½–7 in. long, 2½–3¼ in. broad: fr. axillary, solitary or in pairs, orange-red to purplish, ovoid to ellipsoid, about ¾in. long. Philippines.

útilis, Sim. Large tree: lvs. elliptic-cordate, 6–10 in. long; 4–5 in. broad, obtuse, leathery; petiole thick, 2–4 in long; stipules membranaceous, 4–6 in. long, 1½–2 in. broad, obtuse, yellowish with brown spots: fr. solitary or clustered, almost globos, pubescent. Natal and Zululand.—Used for the manufacture of native cloth and rough cordage.

GALÈGA. Page 1311.

bícolor, Hausskn. Perhaps a form of *G. officinalis:* lfts. oblong-linear rather than oblong-lanceolate, often retuse: raceme more lax or open: calyx-teeth mostly shorter than the tube rather than longer: standard deep blue, the wings and keel whitish blue. Mesopotamia.

GENTIÀNA. Page 1323.

tibética, King. A Himalayan species of which no close relatives from that region are described in this Cyclopedia, and which now appears as a name in the trade. Described by King as follows: st. very stout, erect, 18-in. high, simple: st.-lvs. 6 in. long, lanceolate, connate at base into a cylindric sheath, the uppermost sessile and whorled and forming an involucre to the infl.: fls. crowded in the uppermost axils, sessile; calyx tubular, membranous, truncate, split on one side, the mouth minutely 5-toothed; corolla nearly 1 in. long, tubular-funnel-shaped, the lobes 5, triangular with a triangular fold in each sinus: caps. included; seeds ellipsoidal.

HELICHRÝSUM. Page 1450, after *H. arenarium.*

angustifòlium, DC. Subshrub, the many virgate sts. appressed-canescent: lvs. linear, odorous, margins revolute: fl.-heads in a compound lax terminal corymb, small, oblong-cylindric, the pale involucre with few imbricate scarious obtuse scales. S. Eu.—Said to be a good plant for edgings, with white foliage.

HIBÍSCUS. Page 1483.

The names *H. cruentus* and *H. Lambertianus* in lists are probably forms of *H. Rosa-sinensis;* however, the botanical species bearing these names may be described, as surety:

cruéntus, Bertol. St. erect, unarmed: lvs. petioled, palmately 3–5-fid, base cuneate, lobes oblong, lanceolate, obtuse, obtusely crenate: fls. racemose, red, 2–3 or solitary; outer calyx half shorter than the inner, many-parted, the segms. lanceolate-linear, acuminate, inner deeply 5-fid, much larger, about 1 in. long; caps. ovate. Guatemala.

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Lambertiànus, HBK. Herb: st. simple, 6 ft. high, aculeate, minutely pilose: lvs. petioled, ovate-lanceolate, acuminate, base rounded, serrate, hirsute and green above, below canescent-tomentose, 5 in. or more long; stipules linear-subulate: fls. axillary, solitary, pedunculate, large; calyx double, outer 11-parted, divisions linear, inner campanulate, 5-parted; corolla 5-parted, unequally oblong, apex rotundate, base cuneate. Venezuela.

ÍNULA. Page 1655, after *I. hirta.*

montàna, Linn. Perennial, with erect mostly 1-headed villous st.: lvs. lanceolate, entire, villous, the radical ones narrowed into petiole: outer involucre scales oblong-lanceolate and somewhat obtuse, the inner ones acute: achene hairy: plant about 1–1½ ft. high, the heads bearing many narrow yellow rays. S. Eu.

ÌRIS. Section Evansia, species 1–5, page 1669.

gracílipes, Gray. Rootstock slender and branched: lvs. 3–4, radical, linear and grass-like, becoming 1 ft. long: peduncle filiform, about the length of the lvs., 1–3-headed: fl. solitary and sessile in the scarious 1-lvd. spathe, lilac; tube exceeding the 3-angled ovary, the segms. obcordate-oblong, the exterior lobes glabrous; crest yellow; stigma 2-fid, cut. N. Japan.—Small plant, about 8 in. high, flowering freely in May.

JUNÍPERUS. Page 1728.

chinénsis var. procúmbens, No. 11. Under this name apparently three different forms have been confused; these are:

chinénsis var. japónica, Vilm. (*J. japónica,* Carr.). A dwarf shrub with foliage mostly of the juvenile type; of this two forms are in cult.: Var. **japónica aùrea,** Bean (*J. chinénsis* var. *procúmbens aùrea,* Beiss.). Of more spreading habit with a few long branches, the young growth golden yellow. Var. **japónica aùreo-variegàta,** Bean (*J. chinénsis* var. *procúmbens aùreo-variegàta,* Beiss.). Of more compact and upright habit, the young growth variegated with golden yellow.

chinénsis var. **Sárgentii,** Henry. A prostrate form with long spreading stems, the lateral branchlets ascending, forming dense mats; lvs. on young plants almost all acicular and grass-green, on fruiting plants all or nearly all scale-like and bluish green. Japan.—As a ground-cover this juniper is one of the most valuable. Intro. in 1892 to the Arnold Arboretum by Sargent and subsequently distributed as *J. chinensis* var. *procumbens.*

procúmbens, Sieb. (*J. chinénsis* var. *procúmbens,* Endl.). Low prostrate shrub with the branches ascending at the ends: lvs. bluish green or glaucous, all acicular, in 3's, lanceolate, pungent, with a broad white band above divided near the apex by the green midrib: fr. not known. Japan.—Closely related to *J. squamata* from which it may be distinguished by the branchlets being glaucous-white on the edges of the pulvini.

LÀRIX. Page 1823.

The hybrid between *Larix decidua* and *L. leptolepis* mentioned under *L. decidua* has been named **L. hýbrida.** Its lvs. are much like those of the *L. leptolepis;* the mature branchlets are light brownish yellow and slightly bloomy.

LITHOCÁRPUS (literally *stone fruit*). *Fagàceæ.* The article Pasania (page 2479) is to be referred to this new entry, as Lithocarpus is the older name and is the tenable one under the rules (see note in Sargent, Pl. Wilson. III. 205). Of Lithocarpus the following species are known to be in cult:

densiflòra, Rehd. (*Pasània densiflòra,* Vol. V, p. 2479).

cleistocárpa, Rehd. & Wilson (*Quércus cleistocárpa,* Vol. V, p. 2890).

córnea, Rehd. (*Pasània cornea,* Vol. V, p. 2479).

glàbra, Rehd. (*Pasània glàbra,* p. 2479).

Hénryi, Rehd. & Wilson (*Quércus Hénryi,* p. 2890).

thalássica, Rehd. (*Pasània thalássica,* p. 2479).

LYSIMÀCHIA. Page 1935.

japónica, Thunb. Annual: st. slender and decumbent, simple, villous or pubescent, the apex erect: lvs. opposite, petiolate, roundish and subcordate to ovate, obtuse, entire: fls. 1 or 2 in the axils, the peduncle shorter than the lvs. and reflexed in fr.; corolla ⅛in. or less across, yellow, the gland-dotted segms. oblong. In moist places and about fields, Japan, China, India, to the Philippines.—Whether the creeping yellow-fld. plant listed under this name is the true *L. japonica* is apparently yet to be determined.

NEPHRÓLEPIS. Page 2131.

To supplement the original account of Nephrolepis, there are published herewith revised lists of varieties. The first list (A) represents the forms now growing in the living collection of the Brooklyn Botanic Garden (1916–1917). It may be accepted as accurate as far as it concerns the varieties of *N. exaltata.* With respect to the varieties of species other than *N. exaltata,* no assurance of accuracy can be given. The proper classification of the wild forms of Nephrolepis is one of the most difficult problems in fern taxonomy, and with the inclusion of horticultural forms the difficulty is increased. The second list of names represents those forms which it has not yet been possible to secure for cultivation at the Botanic Garden. They are listed here merely to make the list of named forms as complete as possible. Most of the list was published in "Horticulture," October 28, 1916, accompanied by names of originators.

Regarding the other forms, it may be said that for American florists the Exaltata group includes practically all forms of commercial value. All these would be classed as greenhouse forms. Most of the species and varieties other than Exaltatas are stove forms. A few, especially the forms of *N. cordifolia* (including *N. tuberosa,* a synonym), and *N. pectinata,* will stand as much cold as the Exaltata varieties. Many of them are worth a place in a collection, but in general they do not make the many-leaved bushy plants so much prized by the American grower.

It may be noted that a form of *N. cordifolia* is apparently invariably now being grown and offered in the United States as *N. exaltata.* The true *N. exaltata* is really a very different form, more like *N. bostoniensis,* but easily distinguished by its greater stiffness and fewer leaves. Another point of distinction between the Exaltata group and the other is that, with the exception of *N. exaltata* itself, none of this group is spore-fertile. Microscopic examination shows no fertile spores, but does show apparently abortive sporangia. It is practically useless, therefore, to attempt to raise these from spores. Notwithstanding this statement, it may be noted that several widely separated raisings have been reported in which the sporelings showed great variation, and it is not at all impossible that a fertile variety might develop from any one of the forms. Practically all the forms of other species (not *N. exaltata*) are spore-fertile, and may be readily raised in this way. In fact most of the new horticultural varieties in Group AA are reported as having originated from spores.

Finally, in Group AA, there are listed below a number of names for which no plants have been yet secured. They are probably mostly if not all of English origin, and likely to fall in the group of varieties of species other than *N. exaltata.*

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A. *Nephrolepis exaltata and its varieties.*

B. *Forms with once-pinnate foliage.*

exaltata: wild species, tropics generally.
bostoniensis.
Childsi.
Dreyeri.
Dwarf Boston.
Edmontoniensis. (English.)
falcata. (There is also an English *falcata*.)
Gretnai.
Giatrasi.
Harrisi.
New York.
Randolphi.
Roosevelti.
Schultheisi.
Scotti.
splendida.
Teddy, Jr.
viridissima.
Wagneri.
Wanamakeri.

BB. *Forms with twice-pinnate foliage.*

Anna Foster.
Baby Pierson (parentage uncertain).
Barrowsi.
Clarki.
duplex bernsteili.
Elmsfordi.
Fosterianna (same as Anna Foster).
Kingsessing.
Millsi.
Piersoni.
Piersoni "improved."
robusta.
Schilleri.
Scholzeli.
splendida.
superbissima.

BBB. *Forms with thrice-pinnate foliage (sometimes producing 2-pinnate forms).*

Clarki.
elegantissima.
elegantissima "improved."
elegantissima compacta
elegantissima cristata. (English.)
exaltata cristata. (Eng.)
Galvestoni.
lycopodioides. (English.)
muscosa.
Piersoni compacta (elegantissima compacta).
Pruessneri.
Scholzeli (sport).
superior.
todeoides. (English.)
todeoides compacta. (Eng.)
todeoides superba. (Eng.)
Verona.
Whitmani.
Whitmani "improved."
Whitmani compacta.
Wichersi.
Wredii. (English.)

BBBB. *Forms with 4-pinnate foliage.*

Amerpohli.
dissecta. (English.)
Goodii.
"gracillima" (not certainly the original gracillima of Barrows).
magnifica.
Marshalli. (English.)
Marshalli compacta. (English.)
Neuberti.
pulcherrima. (English.)
Rochfordi. (English.)
Smithi.

BBBBB. *Forms with 5-pinnate foliage.*

Craigi.
Willmotæ. (English.)

AA. *Nephrolepis varieties and species other than exaltata.*

acuminata.
acuta.
Barteri.
Bausei.
biserrata.
biserrata (*davallioides*) furcans.
biserrata furcans minor (*davallioides furcans minor*).
biserrata var. (Undetermined form.)
canaliculata. (English.)
concinna.
cordata compacta: cordifolia compacta.
cordifolia compacta.
cordifolia gigantea.
cordifolia elegans.
cordifolia tesselata.
crispata congesta.
davallioides: biserrata.
davallioides furcans: biserrata furcans.
Duffii.
ensifolia. (English.)
exalta (=cordifolia).
"*exaltata furcans*" =biserrata furcans.
"*exaltata grandiceps*" =biserrata furcans minor.
falcata. (English.)
Faulkneri. (English.)
floccigera.
Golwigheriana (Zollingeriana.)
Hestoni. (English.)
Hestoni cristata. (English.)
hirsutula.
hirsutula tripinnatifida.
Longii (=superba).
Mayii.
Mayii cristata.
Mayii ornata.
pectinata.
philadelphiensis.
philippinensis. (English.)
pluma.
recurvata.
rivularis.
rufescens (=hirsutula).
rufescens amabilis.
rufescens elegans.
rufescens tripinnatifida.
rugosa. (English).
splendens.
superba.
tuberosa.
tuberosa plumosa.
undulata. (English.)
washingtoniensis.
Westoni.
Wittboldii.
Zollingeriana.

R. C. BENEDICT.

NESTRÒNIA (according to the author, derived from a Greek word for Daphne). Syn., *Darbya*. *Santalàceæ*. Native deciduous shrub closely related to Buckleya and differing chiefly in its axillary fls., tufts of hairs at the base of the stamens, simple stigma, and in its globose fr. without enlarged persistent sepals. It has no particular ornamental qualities, but is botanically interesting, as it is a parasitic shrub growing like buckleya on the roots of trees, chiefly on those of pines and oaks. For cult. see *Buckleya*. The only species is **N. umbéllula,** Raf. (*Dárbya umbellulàta*, Gray. *Búckleya umbellulàta*, Hieron.). Glabrous shrub, 1–3 ft., spreading by suckers: lvs. opposite, short-petioled, oval or ovate to elliptic-oblong, acute or obtusish, usually narrowed at the base, bright green, 1–2½ in. long: fls. 4-merous, dicœcious, apetalous, greenish white, small; the staminate slender-pedicelled in 3–9-fld., peduncled umbels; stamens 4, short; pistillate fls. solitary, on stalks ⅛–¼in. long, with ovate calyx-lobes much shorter than the tube: fr. globose, about ½in. across, purplish, bloomy, crowned by the remnants of the calyx-limb. May; fr. in June. Va. to Ga. and Ala. S.F. 7:75.

ALFRED REHDER.

NYMPHÆA. Page 2310.

ovalifòlia. (After No. 4.) The plant called *Nymphæa ovalifolia*, as intro. into gardens in 1916, is from newly imported African seed, and was first raised by E. T. Harvey, of Cincinnati. It is not the true *N. ovalifolia*, Conard. The new plant has more oval lvs. than *N. cærulea*, and larger and paler fls. It is to be regarded as a form of *N. cærulea*, deserving a personal name rather than a Latin name. In 1908 Gilg of Berlin described 6 new species of African water-lilies, all allied to *N. cærulea*. The new form here mentioned falls between *N. magnifica* and *N. spectabilis* of Gilg, having certain characteristics of both species.—The plant is "a prodigious grower, the lf.-stalks extending 10 or more ft." The fl. is "a rich cream color tipped with blue at the end of the petals." (Quotations from letters from Mr. Harvey.) Petals 20; stamens 92; carpels 21; sepals thickly marked outside with black lines and dots. Fl. 6–8 in. across. (Data from specimens furnished by Mr. Harvey.)

N. ovalifolia, Conard, Monogr. Nymph, 150, is from German E. Afr., apparently not in cult. Lvs. narrowly elliptic, with large irregular brown blotches above but plain green beneath: fls. deep blue, closed in dull weather.

H. S. CONARD.

PASÀNIA. Page 2479.

The oldest and tenable name for this genus is Lithocarpus, which is entered on page 3569. The species of Pasania in the supplementary list of Quercus, page 2890, are also to go into Lithocarpus.

PAVÒNIA. Page 2489.

hastàta, Cav. St. pubescent: lvs. short-petioled, orbicular to oblong, sometimes deltoid, sagittate or hastate, dentate, somewhat tomentose beneath, pubescent above; stipules filiform: pedicels axillary and 1-fld., the involucel 5-bracted, the petals rose-colored and veined at the base with purple. Brazil.—Offered in Calif., as a small purplish-fld. shrub.

PELARGÒNIUM. Page 2532.

acerifòlium, L'Her. One of the Pelargium section, allied to No. 20, inserted here because *Geranium citriodorum* is a name in the trade and the *G. citriodorum*, Cav., is considered to be referable to *P. acerifolium:* the species *P. acerifolium* is shrubby or subshrubby, 3–4 ft. tall, glaucous-green, differing from *P. angulosum* (of which Harvey makes it a variety) in having the lvs. more cuneate at base, more deeply lobed, and more scabrous. S. Afr.—Knuth, in his recent Monograph, keeps the species distinct.

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PHILADÉLPHUS. Page 2581.

Add to *P. inodorus:* **P. gloriòsus,** Beadle, is probably not specifically distinct from *P. inodorus;* it differs chiefly in the cup of the calyx being abruptly contracted at the base, not gradually narrowed into the pedicel.

PINÁNGA. Page 2626.

decòra, Lind. & Rod. Unarmed: trunk tall: sheaths, margin of petioles and nerves at first brown; lf.-segms tessile, broadly lanceolate, long-acuminate or sometimes with the apex bifid and rotundate. Borneo.

pátula, Blume. Trunk tall: lvs. unequally pinnatisect, 1–1½ ft. long, 9–14 in. broad; segms. falcate-lanceolate, acuminate, the uppermost with their apex truncate-dentate, and their base equally or unequally attenuate: spadix erect or pendulous, 2–3-fid: fr. ellipsoid, acute, obscurely striate. Sumatra.—Said to be a dwarf species as grown in pots and useful for conservatory. This and the above are recently listed.

PÌNUS. Page 2640.

After *P. sylvestris* var. *pumila* add: Var. **Wâtereri,** Hort. (*P. Wateriàna,* Hort.). Dense columnar form with steel-blue short lvs.

POTENTÍLLA. Page 2773.

Add to *P. fruticosa:* Var. **parvifòlia,** Wolf (*P. parvifòlia,* Fisch.). Lfts. usually 7, oblong-elliptic, glabrescent, ⅛–⅓in. long: fls. pale yellow, ¾–1 in. across. Cent. Asia, W. China, Himalayas. It may here be remarked that var. *Veitchii,* Bean, can scarcely be considered a hybrid of typical *P. fruticosa* and var. *dahurica* as formerly supposed, for it is now reported as common in Cent. and W. China, where var. *dahurica* has not yet been found; it was intro. in 1902, while var. **Frièdrichsenii,** Rehd. (*P. Frièdrichsenii,* Spaeth) was raised about 1895 in Spaeth's nursery from seed of var. *dahurica;* it differs from var. *Veitchii* in the yellowish fls. with narrower outer sepals, narrower and larger lfts. and pale, not lustrous brown stipules.

PTYCHORÀPHIS. Page 2856.

singaporénsis, Becc. (*Drymophlœus singaporénsis,* Hook. *Ptychospérma singaporénsis,* Becc.). Trunk low, about 4½ ft. high: lvs. about 5 ft. long, pinnately pectinate, segms. narrowly lanceolate, acuminate, about 8 in. long: spadices about 1 ft. long, simply branched from the base. Singapore.

RHODODÉNDRON. Pages 2938, 2942.

4. **R. arbutifòlium.** Two species or hybrids are involved here. The synonyms *R. oleæfolium* and *R. Wilsonii* should be eliminated. *R. arbutifolium* is probably a hybrid of *R. ferrugineum* and *R. carolinianum.* The lvs. are elliptic, not "to elliptic-lanceolate," and the size is 1½–2½ in. After *R. arbutifolium* insert:

lætévirens, Rehd. (*R. Wilsonii,* Hort., not Nutt. *R. Wilsoniànum,* Hort. *R. oleifòlium,* Hort., not Franch.). Probably a hybrid of *R. ferrugineum* and *R. minus.* Very similar to *R. arbutifolium,* but of slenderer, looser habit, with narrower and longer elliptic-lanceolate lvs. of a brighter green. This plant is generally cult. under the name *R. Wilsonii,* while the preceding one is known in English gardens as *R. arbutifolium.*

austrìnum, Rehd. (*Azàlea austrìna,* Small). (After *R. calendulaceum,* No. 35.) Shrub, to 10 ft.: branchlets pubescent and usually glandular: lvs. oval or obovate to oblong-spatulate, acute or mucronulate, finely pubescent, ciliate, 1–3½ in. long: fls. before the lvs., yellow or orange; calyx-lobes deltoid or triangular-lanceolate: corolla funnelform, about 1 in. long, the tube scarcely dilated up to the limb: lobes broad, acute: caps. finely glandular-pubescent. Fla.

RÌBES. Page 2963.

In the Suppl. List under *R. Culverwellii,* strike out var. *wollense* which has turned out to be nothing but *R. divaricatum* (see Kew Bull. 1914:382).

SÀLIX. Pages 3052.

To No. 6, after var. *decipiens,* W. D. Koch (*S. decipiens,* Hoffm.) add: Var. **bullàta,** Spaeth (*S. bullàta,* Hort.). Forms a compact subglobose bush.

Between Nos. 6 and 7 insert:

rùbens, Schrank (*S. álba* × *S. frágilis. S. Russelliàna,* Smith. *S. víridis,* Fries). Intermediate between the parents. Tree; branchlets less fragile at the base than *S. fragilis:* lvs. silky when young, glabrous at maturity, intermediate in size: stalk of caps. longer than in *S. alba.* Occurs frequently between the parents. Var. **palústris,** Schneid. (*S. palústris,* Hort.). Silky pubescence of lvs. persisting.

To No. 7, add the following variety: Var. **cálva,** G. F. W. Mey. (*S. álba* var. *cærùlea,* Smith). Of pyramidal habit: lvs. larger, at maturity glabrescent, more bluish green above and more glaucous below.

After No. 7 insert:

hexándra, Ehrh. (*S. álba* × *S. pentándra*). Low tree; mature branchlets glabrous: lvs. lanceolate, green on both sides, silky at first, becoming glabrous: catkins like those of *S. alba;* stamens 4–6. In Eu., with the parents.

After Salix No. 17 insert several species and hybrids, as follows:

latifòlia, Forbes (*S. Cáprea* × *S. myrsinifòlia*). Shrub: branchlets pubescent: lvs. oval or obovate to oblong, usually acute, irregularly serrate, dark green and finally glabrous above, glaucescent and silky below at first, finally glabrescent: ovary thinly silky or partly glabrous. Occurs with the parents.

Erdíngeri, Kerner (*S. Cáprea* × *S. daphnoìdes*). Tall, arborescent shrub: young branchlets short-pubescent, older branches glabrous: lvs. obovate-oblong to oblong, acuminate, usually narrowed at base, entire or slightly serrate, pubescent while young, nearly glabrous at maturity: ovary usually glabrous or thinly silky. Occurs with the parents. Var. **creménsis,** Rehd. (*S. creménsis,* Kerner). Closer to *S. Caprea:* lvs. broader, more densely pubescent beneath: ovary silky.

Wimmeriàna, Gren. & Godr. (*S. Cáprea* × *S. purpùrea*). Shrub with upright branches: young branchlets sparingly short-pubescent, later glabrous, brown: lvs. oblong or obovate-lanceolate to lanceolate, acute, narrowed at the base, irregularly serrate, thinly silky-pubescent while young, later glabrous, dark green and lustrous above, glaucescent below: stamens connate at base; ovary grayish pubescent. Occurs with the parents.

cinèrea, Linn. Large shrub or small tree, to 25 ft.: 1- and 2-year-old branchlets tomentose: stipules often persistent: lvs. obovate or elliptic, acute or rounded, narrowed or rounded at the base, irregularly serrate, pubescent on both sides, 1½–2½ in. long: catkins sessile, before the lvs.; staminate ovoid; filaments pilose, free; pistillate cylindric; ovary pubescent; style very short or wanting. April. Eu., N. Afr., W. and N. Asia. Var. **oleifòlia,** Reichb. (var. *angustifòlia,* Döll). Lvs. elliptic-lanceolate.

Læstadiàna, Hartm. (*S. cinèrea* × *S. lappònum. S. canéscens,* Fries). Low or medium-sized shrub: young branchlets pubescent, older glabrous: lvs. obovate to oblong, acute or short-acuminate, narrowed at the base, irregularly serrate or entire, pubescent above, tomentose beneath: fls. before the lvs.; stamens sparingly hairy at the base; ovary pubescent; style to one-third as long as ovary. N. Eu. with the parents.

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sórdida, Kerner (*S. cinèrea* × *S. purpùrea. S. Pontederàna*, W. D. Koch, not Willd.). Tall upright shrub: young branchlets tomentose, later glabrous, brown or yellowish: lvs. elliptic to lanceolate, acute, cuneate or rarely obtuse at the base, irregularly serrate, pubescent while young, later glabrous above, glabrescent and glaucous beneath: catkins on short, often leafy stalks; stamens usually connate one-half; ovary pubescent with short style. Eu. with the parents.

aurìta, Linn. Shrub, 3–8 ft.: branches spreading, usually glabrous at maturity: stipules persistent, broad: lvs. short-petioled, obovate to elliptic, obtuse, usually rounded at base, irregularly dentate or nearly entire, pubescent on both sides or nearly glabrous above, glaucous beneath, 1–2, rarely to 3 in. long: catkins short-stalked or nearly sessile, a little before the lvs., the staminate broadly elliptic, with long filaments hairy at base; the pistillate cylindric; ovaries hairy; style very short or wanting. April. Eu., W. Asia to Altai Mts.

ambígua, Ehrh. (*S. aurìta* × *S. rèpens*). Shrub, about 3 ft., with creeping st.: branchlets glabrous: lvs. elliptic to lanceolate, somewhat rugose, pubescent, later glabrescent above, about 1 in. long: catkins a little before the lvs.; ovary pubescent; style rather long. In Eu. with the parents.

ludíficans, White (*S. aurìta* × *S. phylicifòlia*). Shrub: branchlets glabrous at maturity: stipules usually persistent: lvs. elliptic to narrowly obovate, crenulate, glabrous at maturity, glaucous beneath: catkins rather small, on leafy stalks, cylindric; ovary pubescent. N. Eu., with the parents.

sesquitértia, White (*S. aurìta* × *S. phylicifòlia* × *S. purpùrea*). Intermediate in general appearance between *S. aurita* and *S. phylicifolia:* lvs. in shape like the former but with the nervation of the latter and nearly glabrous at maturity: stamens quite connate; ovary pubescent with slender style. Observed in England with the parents.

grandifòlia, Ser. (? *S. appendiculàta*, Vill.). Shrub, to 10 ft., with spreading branches: branchlets tomentose while young; stipules often conspicuous, semi-cordate: lvs. oval to obovate-lanceolate, acute, cuneate or rounded at the base, crenately serrate, glabrous at maturity except the pubescent midrib beneath, dark green above, light green or glaucescent and reticulate beneath, 2–6 in. long: catkins before or with the lvs. on short stalks with small bract-like lvs.; stamens hairy below; ovary long-stalked, pubescent; style short. Higher mountains of Cent. and S. Eu.

neriifòlia, Schleich. (*S. grandifòlia* × *S. purpùrea. S. Pontederàna*, Schleich., not Willd. *S. austrìaca*, Kerner). Shrub, to 6 ft., with upright slender branches: young branchlets pubescent, later glabrous, greenish or brown: stipules rather narrow: lvs. obovate-lanceolate to lanceolate, acute, serrulate, glabrous at maturity, glaucescent and reticulate beneath, 2–3 in. long: catkins shortly before the lvs.; filaments more or less connate; ovary stalked, pubescent, with very short style. Cent. Eu. with the parents.

myrsinifòlia, Salisb. (*S. nígricans*, Smith. ? *S. spadícea*, Chaix). Shrub, to 12 ft.: branchlets hairy or glabrescent, dull: stipules often rather large, subcordate: lvs. varying from elliptic, or rarely suborbicular to oblong-obovate or broadly lanceolate, usually acute, rounded at the base, serrate to nearly entire, glabrous or glabrescent above, more or less pubescent beneath, 1–3 in. long, usually blackish when dried: catkins with or a little before the lvs., short-stalked, bracted or leafy at the base; staminate rarely exceeding ¾in.; pistillate cylindric; ovary stalked, usually glabrous, style slender. Eu., W. Asia to Kamchatka.—A very variable species.

tetrápla, Smith (*S. myrsinifòlia* × *S. phylicifòlia*). Intermediate between the closely related parents. It can best be recognized by the combination in various degrees of the characters of the two species which are chiefly the duller and more pubescent branches and lvs. and the larger stipules of *S. myrsinifolia* and the more shining and glabrous branches and lvs. and the smaller stipules of *S. phylicifolia*. Occurs in Eu. between the parents.

phylicifòlia, Linn. (*S. bícolor*, Ehrh.). Upright shrub, to 3 or rarely 8 ft., with stiff and rather short branches: branchlets glabrous, polished: stipules small, caducous, or wanting: lvs. short-petioled, elliptic or elliptic-oblong, acute, rounded at base, nearly entire or minutely crenate-serrate, glabrous at maturity, yellowish green and glossy above, glaucous beneath, 1–3 in. long, not black when dried; catkins before or with the lvs., on short leafy stalks; ovaries pubescent or sometimes glabrous, stalked; style rather long. N. and Cent. Eu., N. Asia.

To Salix, No. 24, add: Var. **Gmélinii,** Anderss. (var. *songàrica*, Regel). Fls. with the lvs.; ovary sessile, obtuse with a short and thick style and long stigmas. Russia, N. and Cent. Asia.

After Salix, No. 24, insert three:

stipulàris, Smith (*S. cinèrea* × *S. viminàlis. S. holosericea*, Willd.). Shrub or small tree: branchlets long and stout, persistently pubescent: lvs. lanceolate to oblong-obovate, acute or acuminate, irregularly serrulate or crenulate, hairy on both sides, more densely beneath, 3–7 in. long: catkins before the lvs., short-stalked or nearly sessile; stamens very long; ovary stalked, pubescent, with short style and slender stigmas. Eu., N. Asia, with the parents.

daphnoìdes. Vill. Tall shrub, to 30 ft., rarely tree: branchlets yellowish or brownish, bloomy, glabrous: stipules cordate: lvs. short-stalked, lanceolate, acuminate, glandular-serrulate, glabrous, glaucescent beneath, 1½–3 in. long: catkins sessile, before the lvs.; staminate nearly 2 in. long, filaments sometimes united at the base; pistillate rather shorter; ovary short-stalked, glabrous, with long style. N. and Cent. Eu., N. and Cent. Asia.

acutifòlia, Willd. (*S. daphnoìdes* var. *acutifòlia*, Döll). Closely related to the preceding species: branchlets darker colored, more bloomy: stipules lanceolate, lvs. narrower and longer, lanceolate to linear-lanceolate, long-acuminate: catkins smaller. Eu., N. Asia.

After Salix, No. 27, insert three:

Pìperi, Bebb. Shrub, to 20 ft.: branchlets glabrous, dark brown: lvs. elliptic-oblong, obovate or oblanceolate, acute, undulate crenate or nearly entire, glabrous, glaucous beneath, 4–6 in. long: catkins sessile or short-peduncled; stamens united or free at base; ovary smooth; style rather long. Wash.

hastàta, Linn. Shrub, to 6 ft., young branchlets pubescent, older glabrous, brown: stipules often very large, obliquely ovate: lvs. elliptic or ovate, acute, glabrous, irregularly serrulate, 1½–2½ in. long: catkins with the lvs., in leafy stalks; filaments glabrous; ovary glabrous, style rather long. Eu., N. and Cent. Asia.

glàbra, Scop. Low shrub, to 4 ft., with short, stout branches: young branchlets glabrous, brown: lvs. broadly oval or obovate to oblong, acute, rarely obtuse at the ends, minutely crenulate, glabrous, glaucescent beneath, 1½–3 in. long: catkins with the lvs., on leafy stalks: filaments pubescent at the base; ovary stalked, glabrous, style rather long. Cent. Eu.

After Salix, No. 29, insert two:

Reùteri, Moritzi (*S. daphnoìdes* × *S. incàna. S. Wimmeri*, Kerner). Tall shrub; young branchlets densely pubescent, older brown, glabrous, often bloomy: stipules small, lanceolate; lvs. lanceolate or narrowly

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lanceolate, acute at both ends, serrulate, silky pubescent while young, glabrescent at maturity, dark green above, glaucescent beneath, 1½–3 in. long: catkins before the lvs., nearly sessile, cylindric; staminate 1–1½ in. long; ovary short-stalked, glabrous, with short style. Cent. Eu., with the parents.

gracilistỳla, Miq. (*S. Thunbergiàna*, Blume). Shrub: young branchlets tomentose, older reddish brown: stipules cordate: lvs. oblong-obovate to oblong-lanceolate, acute at both ends, serrulate, pubescent when young, later glabrous above, thinly pubescent and glaucescent below with prominent veins, 2–4 in. long: catkins cylindric, before the lvs., sessile; staminate 1–1½ in. long, stamens 2, with connate filaments; pistillate longer; ovary pubescent with long and slender style. Japan.

To Salix, No. 30, add the following varieties:

Var. **Lambertiàna,** W. D. Koch. Lvs. broader, generally obovate-lanceolate, more abruptly acuminate, usually more rounded at the base, up to 4 in. long and ¾in. broad. Var. **sericea,** W. D. Koch. Lvs. silky when young, becoming glabrous. Here belongs the "Kecks Willow" (var. *Kécksii*, Hort.). Var. **amplexicaùlis,** Boiss. Lvs. sessile or subsessile, cordate or rounded at the base, acuminate, oblong to oblong-lanceolate, glabrous.

After Salix No. 30 insert two:

rùbra, Huds. (*S. purpùrea* × *S. viminàlis*. *S. Forbyàna*, Smith). Small shrub: young branchlets short-pubescent, older glabrous: lvs. linear to lanceolate-oblong, acute or acuminate, denticulate, pubescent while young, later glabrescent: catkins subsessile, stamens 2, with more or less connate filaments and red anthers; ovary short-stalked, pubescent, with distinct style. Eu., W. to N. E. Asia, with the parents.

Sieboldiàna, Blume. Upright shrub: young branchlets tomentose, older glabrous: lvs. ovate to oblong, acute, rounded at the base, obtusely serrate, dark green and glabrous above, glaucescent and glabrous below, pubescent only when young, 2–3 in. long: catkins cylindric, short-stalked, with small lvs. at the base; stamens 2, distinct or connate, or only 1; ovary stalked, pubescent, style half as long as ovary or shorter, with short oval stigmas. Japan.

SOLÀNUM. Page 3185.

gigantèum, Jacq. (next to No. 34). An erect shrub-like plant growing to a height of 10–25 ft.: sts. somewhat woody, thickly set with short, stout prickles and white-woolly with stellate pubescence: lvs. oblong or oblong-elliptical, narrowed at both ends, about 8 in. long by 3 in. broad, smooth above, and white-tomentose beneath: fls. cymose, pale violet or blue; calyx small, hoary, unequally 5-cleft; corolla about ¾in. diam., rather deeply lobed; ovary puberulous: fr. red at maturity and about ½in. diam. India and Ceylon.—A tender species flowering under cult. when about 4 ft. in height. It is doubtful whether this species is in the American trade, although probably it is as ornamental as other species more or less grown. The *S. giganteum* of lists may be merely a trade name applied to one of the tall-growing species otherwise described under Solanum. W. F. Wight.

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NEW COMBINATIONS IN LATIN NAMES

When a species is transferred to another genus, and when a variety is transferred to another species or associated with another species-name or reduced from specific to varietal rank, the names follow them and a "new combination" results. Thus, if an author desires to place the almond in Prunus rather than in Amygdalus, in which Linnæus originally described it as *Amygdalus communis*, the new combination *Prunus communis* results. If *Ribes leiobotrys* of Koehne is considered by Zabel to be only a form of *R. aureum*, the new combination *R. aureum* var. *leiobotrys*, Zabel, results.

To enable botanists and bibliographers to record and trace the different dispositions and properly to understand the varying opinions of relationships, all such new combinations are entered whenever complete synonomies are made.

In the Cyclopedia, it has been the desire to avoid the making of new combinations, as explained on page xi of Vol. I, although, under the exigencies of the work, a very small number has arisen. In Vols. V and VI, many combinations were inevitable, and these were duly published in Rhodora, XVIII, 152–160 (July, 1916); these were largely in the genera Polyscias, Pyrus, Pæonia, Passiflora, Prunus, Statice, Limonium, Saxifraga, Tropæolum.

A list of several incidental scattered new combinations made in the Cyclopedia itself is here given, so far as desired, without histories, for the easy reference of the bibliographer. These are such combinations as the authors designed to make. Undoubtedly other combinations in the use of varietal names, and in the compilatory shift of other names, may be traced by those who have occasion to work over special groups; but these may not be considered here. The new combinations are mostly of horticultural varieties and of species-forms of minor importance. Numberless associations of varietal names cannot be traced to one definite source, as they are found in trade catalogues, periodicals, and other non-botanical publications, or may be customarily employed by horticulturists; these are therefore given the designation "Hort." (hortorum, "of the gardens;" page xvii, Vol. I). In those cases in the Cyclopedia in which no authority is given for varieties, "Hort." is to be understood.

The dates of the new combinations listed below are those of the publication of the six volumes: Vol. I, A-B, March 25, 1914; Vol. II, C-E, July 22, 1914; Vol. III, F-K, May 12, 1915; Vol. IV, L-O, Feb. 23, 1916; Vol. V, P-R, Oct. 4, 1916, Vol. VI, S-Z March 28, 1917. It will be seen that most of the combinations are in the latter part of the alphabet, and among the names of woody plants. No new species have been described in the Cyclopedia, and very few new varieties.

ALLAMANDA CATHARTICA, Linn., var. **nobilis** (T. Moore) Raffill, I. 247.

ALLAMANDA CATHARTICA, Linn., var. **Schottii** (Pohl) Raffill, I. 247.

ALLAMANDA CATHARTICA, Linn., var. **Hendersonii** (Bull) Raffill, I. 247.

ALLAMANDA CATHARTICA, Linn., var. **grandiflora** (Hook.) Raffill, I. 247.

AMARYLLIS BELLADONNA, Linn., var. **pallida** (Rehd.) Bailey, I. 271.

AMARYLLIS BELLADONNA, Linn., var. **Parkeri** (Hort.) Bailey, I. 271.

BRUNFELSIA CALYCINA, Benth., var. **eximia** (Scheidw.) Raffill, I. 581.

BRUNFELSIA CALYCINA, Benth., var. **floribunda** (Hort.) Raffill, I. 581.

BRUNFELSIA CALYCINA, Benth., var. **macrantha** (Lem.) Raffill, I. 581.

BRUNFELSIA AMERICANA, Linn., var. **pubescens**, Raffill, I. 582.

Cissus oligocarpa (Lev. & Van.) Bailey, II. 775.

FUCHSIA MAGELLANICA, Lam., var. **Riccartonii** (Hort.) Bailey, III. 1301.

Helenium aromaticum (Hook.) Bailey, III. 1443.

HELIOPSIS HELIANTHOIDES, Sweet, var. **Pitcheriana** (Fletcher) N. Taylor, III. 1452.

HIBISCUS LASIOCARPOS, Cav., var. **californicus** (Kell.) Bailey, III. 1486.

Hosta Fortunei (Baker) Bailey, III. 1604.

HOSTA FORTUNEI, Bailey, vars. **gigantea, robusta, argenteo-variegata** (Hort.) Bailey, III. 1604.

HOSTA LANCIFOLIA, Tratt., vars. **albo-marginata** and **tardiflora** (Hort.) Bailey, III. 1605.

HOSTA LANCIFOLIA, Tratt., var. **undulata** (Otto & Dietr.) Bailey, III. 1605.

Hosta longipes (Franch. & Sav.) Bailey, III. 1605.

Lactuca Bourgæi (Boiss.) N. Taylor, IV. 1766. (*Mulgedium Bourgæi*, Boiss.)

LIRIOPE GRAMINIFOLIA, Baker, vars. **minor** and **koreana** (Wright) Bailey, IV. 1890.

LIRIOPE GRAMINIFOLIA, Baker, var. **intermedia** (Maxim.) Bailey IV. 1890.

Lithocarpus densiflora (Hook. & Arn.) Rehd., VI. 3569.

Lithocarpus cornea (Lour.), Rehd., VI. 3569.

Lithocarpus glabra (Thunb.) Rehd., VI. 3569.

Lithocarpus thalassica (Hance) Rehd., VI. 3569.

Maurandia Lophospermum, Bailey, new name, IV. 2013.

PERILLA FRUTESCENS, Brit., var. **nankinensis** (Decne.) Bailey, V. 2553.

Var. NANKINENSIS, Bailey, subvars. **laciniata, macrophylla, variegata, microphylla** (Hort.) Bailey, V. 2553.

PINUS NIGRA, Arnold, var. **pindica** (Formanek) Rehd.; var. **pendula** (Beiss.) Rehd.; var. **pygmæa** (Rauch) Rehd.; var. **prostrata** (Beiss.) Rehd.; var. **Moseri** (Moser) Rehd.; V. 2641.

POTENTILLA FRUTICOSA, Linn., var. **Friedrichsenii** (Spaeth) Rehd., VI. 3571.

PSEUDOTSUGA TAXIFOLIA, Brit., var. **Fretsii** (Beiss.) Rehd.; var. **Moerheimii** (Ruijs) Rehd.; V. 2847.

PYRUS FUSCA, Raf., var. **levipes** (Nutt.) Bailey; var. **diversifolia** (Bong.) Bailey; V. 2876.

RHODODENDRON OBTUSUM, Planch., var. **amœnum** (Lindl.) Rehd. V. 2944.

Rhododendron candidum (Small) Rehd., V. 2945.

RHODODENDRON QUINQUEFOLIUM, Moore & Bisset, var. **roseum**, Rehd., V. 2947.

Rhododendron lætevirens, Rehd., new name, VI. 3571.

Rhododendron austrinum (Small) Rehd., VI. 3571.

RIBES SANGUINEUM, Pursh, var. **albescens**, Rehd., V. 2958.

RIBES ROEZLII, Regel, var. **cruentum**, Rehd., V. 2962.

ROSA CAROLINA, Linn., var. **villosa** (Best) Rehd.; var. **grandiflora** (Baker), Rehd.; var. **triloba** (Baker) Rehd.; V. 2991.

ROSA SPINOSISSIMA, Linn., var. **inermis** (DC.) Rehd., V. 2995.

RUBUS ODORATUS, Linn., var. **albidus**, Bailey, V. 3024.

RUBUS PROCUMBENS, Muhl., var. **roribaccus** (Bailey) Bailey, V. 3031.

SALIX ERDINGERI, J. Kerner, var. **cremensis**, Rehd., n. var., VI. 3571.

SYMPHORICARPOS ALBUS, Blake, var. **ovatus** (Spaeth) Rehd., VI 3293.

TAXUS CUSPIDATA, Sieb. & Zucc., var. **densa**, Rehd., VI. 3316.

THUJA ORIENTALIS, Linn., var. **beverleyensis** (Hort.) Rehd., VI. 3337.

ULMUS FOLIACEA, Gilib., var. **suberosa** (Moench) Rehd.; var. **propendens** (Schneid.) Rehd.; var. **italica** (Henry) Rehd., var. **umbraculifera** (Trautv.) Rehd.; var. **gracilis** (Spaeth) Rehd.; var. **Koopmannii** (Lauche) Rehd.; var. **Ruepellii** (Spaeth) Rehd.; var. **stricta** (Ait.) Rehd.; var. **Wheatleyi** (Simon-Louis) Rehd.; var. **monumentalis** (Ruiz) Rehd.; var. **Dampieri** (Kirchn.) Rehd.; var. **Wredei** (Lauche) Rehd.; var. **pendula** (Rehd.) Rehd.; var. **Webbiana** (Lee) Rehd.; var. **variegata** (Dum.-Cours.) Rehd.; VI. 3412–13.

VIBURNUM WRIGHTII, Miq., var. **Hessei** (Koehne) Rehd., VI. 3461.

VITEX NEGUNDO, Linn., forma **multifida** (Carr.) Rehd., VI. 3481.

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FINDING-LIST

Of Latin or Latinized binomials commonly used in North American literature and commerce, with their equivalents in the Cyclopedia, together with usages that the cataloguer may desire to follow

(Including a few changes and corrections)

This List is compiled primarily for the aid of Cyclopedia users, particularly the nurseryman, seedsman, propagator, planter, landscape architect, gardener, labeller, cataloguer, to place before him the commonest names in the catalogues and periodicals of North America and to give him the equivalents of these names. The information given in this List is all contained in the Cyclopedia; but it is more accessible when separated, being placed together in convenient form disconnected from keys and description and from names of plants known as yet only to collectors, students, and specialists. The attention of the consultant is called to the list of additional species beginning on page 3565, in the supplement to Vol. VI, representing trade names not in the body of the Cyclopedia.

The List represents practically the species now in the trade in North America in the usual temperate parts, although it does not pretend to be complete. It does not contain the many Latin names of horticultural forms that may appear in catalogues as species-names (the real species-name being omitted in parts of many trade-lists). Neither does it contain vernacular names: these will be found in alphabetic order in the Index to the Cyclopedia, beginning page 3611.

All generic entries are introduced by **BLACK-FACE CAPITAL TYPE** (name of the genus).

The species-names in **black-face type** are in all cases those used in the Cyclopedia.

The primary or first-given entries under the genus in every case are the trade names or those used commonly in journals and elsewhere; when these names differ from the Cyclopedia name they are in *Italic type;* when the same as the Cyclopedia name, they are in **black-face type.**

A name in parenthesis is one that is used in the trade or in periodicals: thus, "**Acanthophœnix rubra** (Areca)" means that the plant may appear in catalogues under the name Areca. Such entries are cross-references.

The stars (*) denote the names recommended by the American Joint Committee on Horticultural Nomenclature for the use of nurserymen. These markings are made wholly on the responsibility of the Committee, the List being lent for this purpose, and they are not supervised or recommended by the Editor.

While it is desirable that the names used by botanists and horticulturists shall be the same, yet the dealer is confronted with trade conditions which may modify his practice in some cases. The Editor naturally prefers to stand for the accepted botanical names.

To save space, the abbreviation var. (variety) is omitted; but the Editor does not thereby commit himself to the use of trinomials.

STATEMENT OF THE AMERICAN JOINT COMMITTEE ON HORTICULTURAL NOMENCLATURE

The American Joint Committee on Horticultural Nomenclature was established by the national organizations named below for the purpose of lessening the confusion, inconvenience, and losses which result to buyers and sellers of plants from the widespread use of different names for the same plant and of the same name for different plants.

The organizations participating, with list of committees, are as follows:

American Association of Nurserymen.—J. Horace McFarland, Harrisburg, Pennsylvania; Harlan P. Kelsey, Salem, Massachusetts; Henry Hicks, Westbury, New York; L. A. Berckmans, Augusta, Georgia; C. J. Maloy, Rochester, New York; Frederick V. Coville (Advisory), United States Botanist, Washington, District of Columbia.

American Association of Park Superintendents.—Herman W. Merkel, Forester Zoölogical Park, New York City; John Dunbar, Assistant Superintendent of Parks, Rochester, New York; Theodore Wirth, Superintendent of Parks, Minneapolis, Minnesota.

American Society of Landscape Architects.—Frederick Law Olmsted, Brookline, Massachusetts; Sid. J. Hare, Kansas City, Missouri; William Pitkin, Jr., Rochester, New York; Warren H. Manning, Boston, Massachusetts.

American Pharmaceutical Association.—Dr. H. H. Rusby, Columbia University, New York City; Oliver A. Farwell, Detroit, Michigan; Dr. Lyman F. Kebler, Washington, District of Columbia.

Ornamental Growers Association.—Harlan P. Kelsey, Salem, Massachusetts; C. J. Maloy, Rochester, New York; Thomas B. Meehan, Philadelphia, Pennsylvania; F. L. Atkins, Rutherford, New Jersey.

The representatives of the American Association of Nurserymen and of the Ornamental Growers Association organized as a Joint Committee in 1915, with J. Horace McFarland as Chairman and Harlan P. Kelsey as Secretary.

At a meeting August 1, 1916, in which the representatives of the American Association of Park Superintendents and of the American Society of Landscape Architects also participated, the same officers were continued and the name American Joint Committee on Horticultural Nomenclature was adopted. The representatives of the American Pharmaceutical Association were added to the committee a few weeks later.

Scope of work.

So far as practicable, it is proposed to secure the standardising of a single botanical name, together with a single vernacular or "common" name for every tree, shrub, and herbaceous plant in the American horticultural trade.

It is probable also that the Joint Committee will undertake later to recommend a list of *plant-name abbreviations*, as an aid to those who use plant names daily and continually, such as nurserymen, seedsmen, florists, landscape architects, pharmacists, park officials, and others.

The subjoined starred list of Latin binomials should be considered only as a preliminary report. The magnitude and manifest difficulties of the problem, and lack of time occasioned by the early publication of the last volume of this Cyclopedia, have made it necessary for the Joint Committee to confine its recommendations almost wholly to the "botanical" names of woody plants as given in this "Finding-List." The even more important work of endeavoring to standardize popular or "common" names must follow later.

Practical importance of stability in nomenclature.

The confusion of names in the horticultural plant world is at present so great as to clog popular plant knowledge and actually to limit to no small degree the use of certain trees, shrubs and flowers in our American plantings. The

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consequent loss to the tradesman is obvious. For example, take the common Virginia creeper: We find this catalogued in 1916 under no less than six Latin binomials—*Ampelopsis quinquefolia*, *A. virginica*, *Parthenocissus quinquefolia*, *P. virginica*, *Vitis hederacea*, and *Psedera quinquefolia*, while as common names we have *Woodbine*, *American Woodbine*, *Virginia Creeper*, *American Ivy*, *Common Virginia Creeper*, *Virginian Creeper*, *Wild Woodvine*, and *Five-fingered Ivy*. Today both American and foreign nursery catalogues are filled largely with confused and contradictory lists of plant names, while popular books on gardening and horticulture and the horticultural press themselves are at sea, and little if any better off than the tradesman. It is thus often impossible for the buyer to know whether he will get what he has in mind when placing an order, or something entirely different.

Further, owing to the differing names under which both new and old plants are often catalogued, described, and disseminated, the plantsman and buyer become perplexed and discouraged, and proper interest is not awakened. This often results in the over-use of the commoner and less worthy trees and plants to the exclusion of many beautiful things.

Causes of confusion.

Even when there is complete and well-established agreement among botanists as to the classification and naming of any given plant, mistakes by nurserymen or dealers in identification and labeling are liable to occur, giving rise to much confusion. When a dealer, either through ignorance or accident, sends out a comparatively unknown plant labeled with the name of some other little-known plant, the misapplied name is apt to follow the first plant and become established in trade.

A striking case of this sort is that of the tree so widely disseminated for street planting under the common name "*Carolina Poplar.*" Experts on the poplar state that this is probably *Populus Eugenei*, a hybrid originated in Europe, and that the native *Carolina Poplar* practically never passes in the trade under that name. In this extreme case the transferred name is so universally accepted by the trade that an attempt to correct the original mistake would be inadvisable at present.

When, however, a plant has been widely distributed under the name of some other plant, through a mere mistake in identification, and the plant whose name was mistakenly applied to the other is also in cultivation, there is serious confusion, which can usually best be settled by correcting the original mistake even if it has become widely accepted.

Other causes than mistaken identification of plants have contributed to the existing confusion. These involve differences of opinion and of practice among botanists in regard to plant names when there is no question at all about the identity of the plants. For one thing, in doubtful cases they are not yet wholly agreed upon the rules or "code" which shall apply, to decide which of two or more names shall stand; but these differences are comparatively few. Much more important are differences of personal judgment among botanists as to what constitutes in any given case a sufficient difference between two groups of related plants to place them in different genera, for example, whether the known difference between apples and pears is enough to separate them into two genera, *Malus* and *Pyrus*, or is so slight that they should be consolidated into a single genus. The same sort of difference in judgment arises as to what constitutes a sufficient difference to call for separation into distinct species, and as to what are of varietal rank. These differences are inevitable and are independent of rules or other arbitrary decisions.

For example, *Azalea* is now classed under *Rhododendron* by some botanists, yet for trade reasons it seems inexpedient to catalogue the *Azaleas* as *Rhododendrons*.

Probably the most important cause of changes in botanical nomenclature in recent years is the constant collection of new evidence as to the facts. This evidence is of two sorts: evidence found in botanical literature as to the first proper description and naming of each kind of plant, and evidence as to the structure and habits of the plants themselves. When any group of plants is studied more carefully and thoroughly than before, new facts are sure to be discovered which may alter the classification and nomenclature based on previous incomplete or insufficient knowledge.

Absolute and permanent fixity of botanical nomenclature, therefore, cannot be insured by any arbitrary agreement at this time.

Remedy for the confusion.

For the practical convenience of those who use plants or deal in them there can and ought to be, however, a list of standard trade names for plants in commercial use, to be arbitrarily retained without change for a period of several years, regardless of any changes in the practice of scientific botanists. It is the hope of the Joint Committee that provision will be made for a regular periodic revision of this standard list, perhaps at the same decennial periods adopted by the United States Pharmacopœia Convention for revision of their standard nomenclature of drugs, which includes a large number of plant names. These revisions can bring the list into accord with changes which have become well established among botanists in the interval and the accepted changes can be made substantially at one time throughout the trade.

General adherence to the standard trade names as recommended by the Joint Committee will relieve horticulturists of the confusion directly chargeable to instability of botanical nomenclature and will remove the excuse for careless identification and mislabeling. *No agreement about names will cure troubles unless everyone is careful in the identification and labeling of the plants so as to avoid sending out the wrong plant under the right name.*

While the Joint Committee realizes that its recommendations are somewhat arbitrary, existing conditions make this inevitable. "Trade value" and stability have been guiding influences. The Joint Committee is not constituted to pass on undecided or critical questions of botanical nomenclature.

For a clearer understanding of the situation, the Joint Committee urges all who are interested in this subject to read the discussion under "Names and Nomenclature" in Vol. IV, page 2098, of the "Standard Cyclopedia of Horticulture."

Basis of this report.

The Joint Committee has agreed that Latin names should conform so far as possible to good botanical usage, and that Bailey's "Standard Cyclopedia of Horticulture" should be the basis of our technical name-list.

Only weighty reasons, as in the case of exceptionally well-established names or of existing trade names plainly more appropriate for business purposes, have led the Joint Committee to recommend the retention of trade names differing from the Cyclopedia names. It is admitted that the Latin binomials as starred by the Joint Committee in the Finding-List are all too often at variance with the latest botanical usage. Subsequent revisions by botanists and the Joint Committee may make possible a more uniform standard list in which the botanists and the horticulturists will ultimately be brought together.

Common names.

As the work of the Joint Committee progressed it became increasingly evident that each cultivated plant should have a single and distinctive common name, which might readily become stable and fixed through acceptance by the horticultural interests of America.

The giving of an appropriate common name to a plant is permissibly much more arbitrary and the reasons for subsequently changing it less urgent than is often the case with Latin binomials. When a common name is given a plant new in cultivation it is often quite possible to make

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it descriptive, euphonious, and short, in distinct contrast to many Latin names. Common names are usually easier to remember by those who are not botanists, and they serve a most useful purpose in linking up the plant with its correct or accepted scientific name. The Joint Committee expects in the near future to publish in connection with the scientific names a list of common names, with recommendations for horticultural use, believing that such a list will serve purposes of plant knowledge and identification even more effectively than the present starred list of botanical names.

Identification.

As has been stated, a leading cause of plant-name confusion lies in the careless dissemination of plants under a wrong name. In doubtful cases when means are not at hand for positively identifying plants and labeling them properly, it is earnestly urged that adequate specimens (including flowers, fruit, leaves, and roots, where possible) be sent to a competent authority for correct identification and naming, such as Dr. L. H. Bailey, Ithaca, New York; the United States Department of Agriculture, Washington; any well-equipped botanical garden; or the Arnold Arboretum, Jamaica Plain, Massachusetts. Specimens should be pressed and dried smooth, and sent flat between cardboards.

Acknowledgment.

The Joint Committee wishes to acknowledge its gratitude to Dr. Bailey for the opportunity afforded of presenting to the American horticultural public its first efforts toward standardising plant names through the medium of the "Standard Cyclopedia of Horticulture." Moreover, the Committee has enjoyed the earnest coöperation and advice of Dr. Bailey, and thus the work has been made far more complete and helpful than it could possibly have been otherwise.

Recommendations of the Joint Committee on the use of the Finding-List.

1. The stars (*) denote the names recommended for uniform use by the American horticultural trade, for such period of time as shall elapse until a new list is agreed upon.

2 In cases in which the starred name differs from the Standard Cyclopedia name and the cataloguer or writer for any reason does not wish to use it, the Joint Committee urges the use of the Cyclopedia name rather than the use of a third alternative.

3. When no star appears in the list, as in the case of nearly all the herbaceous plants, the Joint Committee has not yet specifically passed on the names.

4. In cataloguing, the Finding-List will enable one to place other names in parentheses with the name recommended by the Joint Committe, and to use them also as cross-references. Customers seeking a plant will thus be enabled to locate it readily under any of its well-known names if cross-reference is freely used. The Joint Committee believes that there is no better method known of educating the tradesman and public alike to a correct knowledge of plant names and to the consequent adoption of the recommended or standardized name.

Examples: If he were cataloguing certain plants formerly known to systematists as *Andromeda*, a good treatment would be as follows:

Andromeda floribunda. See PIERIS.

And under *Pieris* the entry would be:

PIERIS (Andromeda) FLORIBUNDA.

(NOTE: *The genus Andromeda is not entirely obsolete, but now includes in America only two species, A. polifolia and A. glaucophylla.*)

In some cases, it is only the species that is involved, the genus remaining the same. Thus, the name *Magnolia stellata* is now used in place of *M. Halliana.* Perhaps the best entry would be:

Magnolia Halliana. See M. STELLATA.

And again in its proper place carrying description, sizes, and prices—

MAGNOLIA STELLATA (M. Halliana).

Other examples are

AZALEA NUDIFLORA (Rhododendron nudiflorum).

FRAXINUS NIGRA (F. sambucifolia).

HALESIA TETRAPTERA (H. carolina, Mohrodendron carolinum).

CORNUS STOLONIFERA var. FLAVIRAMEA (var. aurea).

ACER PALMATUM (A. polymorphum) var. ATROPURPUREUM.

These examples will suggest how to make up proper entries. It is further recommended that synonyms introduced in cross-reference or in parentheses always be printed in italics or in smaller type than the accepted standardized name.

5. In cataloguing, labeling, etc., the abbreviation "var." (variety) following a species name may be omitted for the sake of brevity.

The name of a variety or horticultural form is often further abbreviated by omitting the species-name (for example: *Acer purpurascens* for *A. pseudoplatanus* var. *purpurascens*); but this practice is liable to cause confusion, as when specific and varietal names in a given genus are similar or alike, and therefore when a varietal name is so contracted the abbreviation "v." or "var." should be retained (for example: *Acer* var. *purpurascens* for *Acer pseudoplatanus* var. *purpurascens*).

6. It is suggested that all tradesmen publishing catalogues or lists print in a conspicuous place a notice similar to the following: "The names of trees and shrubs in this catalogue are based on the recommendations of the American Joint Committee on Horticultural Nomenclature as they appear in Bailey's Standard Cyclopedia of Horticulture, pages 3575 to 3591."

The Joint Committee takes this opportunity to urge all members of the organizations represented in it and all others interested in standardising plant names to offer criticisms and suggestions for the help and instruction of the Committee in its future work. It is only by persistent effort and coöperation that we may hope to bring reasonable order and understanding out of the existing chaos in plant nomenclature.

AMERICAN JOINT COMMITTEE ON
HORTICULTURAL NOMENCLATURE

HARLAN P. KELSEY, *Secretary*,
Salem, Massachusetts.

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ABELIA. *A. chinensis.
—*grandiflora.
— *rupestris:* *A. grandiflora; also sometimes applied to A. chinensis.

ABERIA. A. caffra.

ABIES. *A. alba:* *Picea canadensis; perhaps sometimes applied to Abies Picea.
— *Alcockiana:* Picea bicolor; often applied to P. jezoensis hondoensis: *Picea Alcockiana.
—*amabilis; sometimes misapplied to A. grandis.
—**arizonica:* A. lasiocarpa arizonica; by some regarded as a distinct species.
—*baborensis.
—*balsamea.
— *brachyphylla:* *A. homolepis is the oldest name for the fir known as A. brachyphylla; the A. homolepsis mentioned on page 175 is A. homolepis umbellata.
— *canadensis:* *Tsuga canadensis.
—*cephalonica.
—*cilicica.
—*concolor.
— *Douglasii:* Pseudotsuga taxifolia: *Pseudotsuga Douglasii.
— *excelsa:* *Picea excelsa.
—*firma.
—*Fraseri.
—*grandis.
—*homolepis.
—*lasiocarpa.
—*magnifica.
—*Mariesii.
— *Menziesii:* *Picea sitchensis.
— *Mome:* *A. firma (the name A. Mome is a *nomen nudum*).
—*nobilis.
—*Nordmanniana.
— *numidica:* *A. baborensis.
— *orientalis:* *Picea orientalis.
—**pectinata:* A. Picea.
— Picea: *A. pectinata.
—*Pinsapo.
— *pungens:* *Picea pungens.
—*sacchalinensis.
—*sibirica.
— *subalpina:* *A. lasiocarpa.
— *umbellicata:* *A. homolepis umbellata.
—*Veitchii.

ABOBRA. *A. viridiflora:* A. tenuifolia.

ABRONIA. *A. arenaria:* A. latifolia.
— umbellata.
— villosa.

ABRUS. A. precatorius.

ABUTILON. A. megapotamicum.
— *Savitzii:* form of A. hybridum.
— striatum, but the stock is likely to be A. pictum.
— *Thompsonii:* A. striatum Thompsonii.
— *vexillarium:* A. megapotamicum.

ACACIA. *A. armata.
—*Baileyana.
—*Cavenia.
—*cultriformis.
—*cyanophylla.
—*cyclops.

ACACIA, continued.
— *dealbata:* *A. decurrens dealbata.
—*decurrens.
—*Drummondii.
—*Farnesiana.
— *floribunda:* *A. longifolia floribunda.
— *Julibrissin:* *Albizzia Julibrissin.
—*juniperina.
—*latifolia.
—*longifolia.
— *lophantha:* *Albizzia lophantha.
—*melanoxylon.
— *mollissima:* *A. decurrens mollis.
— *Nemu:* *Albizzia Julibrissin.
—*neriifolia.
—*podalyriæfolia.
—*pravissima.
—*pubescens.
—*pycnantha.
—*Riceana.
—*saligna.
—*verticillata.

ACÆNA. A. microphylla.

ACALYPHA. *A. hispida.
— *Macafeana:* *A. Wilkesiana Macafeana.
— *marginata:* *A. Wilkesiana marginata, not A. marginata of botanists.
— *mosaica:* *A. Wilkesiana musaica.
— *Sanderi:* *A. hispida.
— *triumphans:* *A. Wilkesiana triumphans.

ACANTHOPANAX. *A. pentaphyllum (Aralia).
—*ricinifolium (Aralia).
By some authors, the name Acanthopanax is considered to be masculine, the specific names to end in *-us;* but the prevailing practice with English and American botanists is to regard the Panax combinations as neuter. These names should be pronounced Acanthóp-anax, Oreóp-anax, Tetráp-anax, etc.

ACANTHOPHŒNIX. A. rubra (Areca).

ACANTHORHIZA. A. aculeata.

ACANTHUS. *A. latifolius:* A. mollis latifolius.
— mollis.
— spinosus.

ACER. *A. campestre.
—* circinatum.
— *colchicum:* *A. cappadocicum.
—**dasycarpum* (Silver Maple): A. saccharinum.
—*ginnala.
—*glabrum.
—*Heldreichii.
—*japonicum.
—*macrophyllum: sometimes used erroneously for A. japonicum macrophyllum.
—*monspessulanum.
—*Negundo.
—*palmatum.
—*pennsylvanicum.
—*pictum.
—*platanoides.
— *polymorphum:* *A. palmatum.

ACER, continued.
—*pseudoplatanus.
—*rubrum.
— saccharinum. This is the Silver Maple, commonly known in the trade as *A. dasycarpum. Much of the stock listed as A. saccharinum is Sugar Maple, which is now known as A. saccharum.
—*saccharum. Sugar or Rock Maple, formerly known as A. saccharinum, but this name is now applied to Silver Maple.
— *sanguineum:* *A. palmatum sanguineum.
— *Schwedleri:* *A. platanoides Schwedleri.
—*spicatum.
—*tataricum.
— *velutinum:* *A. insigne velutinum; sometimes used erroneously for A. Trautvetteri.

ACERANTHUS. A. diphyllus (Epimedium).

ACHANIA. *A. Malvaviscus:* Malvaviscus arboreus.

ACHILLEA. *A. ægyptiaca:* A. Tournefortii.
— Ageratum.
— aurea.
— *Eupatorium:* A. filipendulina.
— filipendulina.
— Millefolium.
— *mongolica:* A. sibirica.
— Ptarmica.
— tomentosa.

ACHIMENES. *A. Haageana:* A. longiflora.
— longiflora.
— patens major.

ACHRAS. A. Sapota.

ACHYRANTHES. *A. acuminata:* Iresine Lindenii.
— *Emersonii:* Iresine Lindenii.
— *Herbstii:* Iresine Herbstii.

ACIDANTHERA. A. bicolor.

ACONITUM. A. autumnale.
— *bicolor:* plants under this name are either A. Napellus bicolor or A. sinensis bicolor.
— Fischeri.
— Lycoctonum.
— Napellus.
— *pyramidatum:* probably A. pyramidale, which is A. Napellus.
— *pyrenaicum:* A. Anthora.
— uncinatum.
— *Wilsonii:* A. Fischeri Wilsonii.

ACORUS. A. Calamus.
— *japonicus:* probably a form of A. gramineus.

ACROCLINIUM. *A. album:* Helipterum roseum album.
— *roseum:* Helipterum roseum.

ACTÆA. A. alba.
— *rubra:* A. spicata rubra; better kept distinct, as A. rubra. Willd.
— spicata.

ACTINIDIA. *A. arguta.
—*chinensis.
—*Kolomikta.
—*polygama.

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ACTINOLEPIS. A. coronaria (Shortia californica).
ADENANTHERA. A. pavonina.
ADENOPHORA. *A. lilifolia:* **A. communis.**
— **Potaninii.**
ADIANTUM. *A. æmulum:* **A. cuneatum.**
— **bellum.**
— **Capillus-Veneris.**
— *Croweanum:* **A. cuneatum Croweanum.**
— **cuneatum.**
— **Farleyense.**
— *Fergusonii:* **A. Capillus-Veneris.**
— *hybridum:* **A. cuneatum.**
— *mundulum:* **A. cuneatum.**
— **pedatum.**
— *rhodophyllum:* a form of **A. tenerum.**
— **Sanctæ-Catharinæ:** a form of **A. trapeziforme.**
— **scutum.**
— **trapeziforme.**
— *Wiegandii:* **A. Wagneri.**
ADLUMIA. *A. cirrhosa:* **A. fungosa.**
ADONIS. A. æstivalis.
— **amurensis.**
— **autumnalis.**
— **pyrenaica.**
— **vernalis.**
ÆGOPODIUM. Æ. Podagraria.
ÆSCULUS. *Æ. californica.
—***carnea.**
—***glabra.**
—***Hippocastanum.**
— *macrostachya:* ***Æ. parviflora.**
—***octandra** (Pavia).
—***parviflora** (Pavia).
—***Pavia** (Pavia).
— *rubicunda:* ***Æ. carnea.**
—***turbinata.**
ÆTHEOPAPPUS. *Æ. pulcherrimus:* **Centaurea pulcherrima.**
ÆTHIONEMA. Æ. coridifolium.
— **grandiflorum.**
— *jucundum:* **Æ. coridifolium** (Iberis).
AGAPANTHUS. A. umbellatus.
AGATHÆA. *A. cœlestis:* **Felicia amelloides.**
AGATHIS. *A. robusta.
AGATHOSMA. A. Ventenatiana (Diosma).
— **villosa** (Diosma).
AGAVE. A. americana.
— **atrovirens.**
— *cærulescens:* **A. lophantha.**
— **ferox.**
— **potatorum** (the more glaucous form of A. Scolymus; very likely something else is really offered under this name; see No. 12, page 233).
— **stricta.**
AGERATUM. *A. album:* Probably **Eupatorium micranthum.**
— *conspicuum:* **Eupatorium glechonophyllum.**
— *Lasseauxii:* **Eupatorium Lasseauxii.**
— *mexicanum:* **A. Houstonianum.**
— *nanum:* probably a dwarf form of **A. Houstonianum.**

AGERATUM, continued.
— *Wendlandii* (identity uncertain; perhaps Alomia Wendlandii, Robins., a genus closely allied to Ageratum; this Alomia, from southern Mexico, is a perennial, 1 foot or more high, with ovate, strongly toothed opposite leaves. Flowers of the plant cultivated under this name are blue or white).
AGLAONEMA. A. costatum.
AGONIS. *A. flexuosa:* ***Leptospermum flexuosum.**
AGROSTEMMA. *A. Cœli:* **Lychnis Cœli-rosa.**
— *Cœli-rosa:* **Lychnis Cœli-rosa.**
— *Flos-Jovis:* **Lychnis Flos-Jovis.**
AGROSTIS. A. nebulosa.
AILANTHUS. ***A. glandulosa: A. altissima,** Swingle (A. glandulosa not tenable, as it is the more recent name).
AIRA. *A. cærulea:* **Molinia cærulea.**
— *foliis variegatis.* **Molinia cærulea variegata.**
AJUGA. A. genevensis.
— **reptans.**
AKEBIA. *A. lobata.
—***quinata.**
ALBIZZIA. *A. Julibrissin.
—***lophantha.**
ALECTRYON. *A. excelsum.
ALEURITES. *A. Fordii.
ALLAMANDA. *A. cathartica.
— *Hendersonii:* ***A. cathartica Hendersonii.**
— *Williamsii:* ***A. cathartica Williamsii.**
ALLIUM. A. ascalonicum (Shallot).
— **Cepa** (Onion).
— **fistulosum** (Welsh Onion).
— **Moly.**
— **Porrum** (Leek).
— **sativum** (Garlic).
— **Schœnoprasum** (Chives).
ALNUS. *A. cordata.
—***glutinosa.**
—***incana.**
— *laciniata:* name probably applied to either ***A. incana pinnatifida** or ***A. glutinosa laciniata.**
—***Mitchelliana** (American Green Alder); either or both **A. viridis** or **A. alnobetula** of American catalogues.
—***rugosa.**
—***tenuifolia.**
—***viridis** (European Green Alder). Often confused with American Green Alder.
ALONSOA. A. acutifolia.
— *albiflora:* **A. acutifiora candida.**
— *grandiflora:* **A. Warscewiczii.**
— **linifolia.**
— **Warscewiczii.**
ALOYSIA. *A. citriodora:* **Lippia citriodora.**
ALPINIA. A. Sanderæ.
ALSINE. A. pinifolia.
ALSOPHILA. A. australis.

ALSTRŒMERIA. A. aurantiaca.
— *aurea:* **A. aurantiaca.**
— **brasiliensis.**
— **chilensis.**
— **pulchella.**
ALTERNANTHERA. *A. aurea:* **Telanthera Bettzickiana aurea.**
— *rosea:* **T. amœna rosea.**
— *versicolor:* **T. versicolor.**
ALTHÆA. *A. frutex:* ***Hibiscus syriacus.**
—***rosea** (Hollyhock).
Many names listed under this genus are probably forms of Hibiscus syriacus, as A. alba, amplissima, argentea, cærulea, carnea, cœlestis, elegantissima, grandiflora, Leopoldii, Meehanii, pæoniflora, punicea, rubra, Van Houttei, and others.
ALYSSUM. A. argenteum.
— *Benthamii:* **A. maritimum Benthamii.**
— **maritimum.**
— *procumbens:* **A. maritimum procumbens.**
— **rostratum.**
— **saxatile.**
AMARANTHUS (the spelling Amarantus, while etymologically correct, is not now much used in this country, the form Amaranthus having been employed by Linnæus). *A. atropurpureus:* probably **A. caudatus atropurpureus,** not A. atropurpureus of botanists.
— *bicolor:* **A. gangeticus melancholicus.**
— **caudatus.**
— *cruentus:* signifies either **A. hypochondriacus sanguineus** or **A. paniculatus cruentus.**
— **gangeticus.**
— **Henderi.**
— *melancholicus:* **A. gangeticus melancholicus.**
— **salicifolius.**
— *tricolor:* **A. gangeticus melancholicus.**
AMARYLLIS. *A. Atamasco:* **Zephyranthes Atamasco.**
— **Belladonna.**
— *equestris:* **Hippeastrum equestre.**
— *formosissima:* **Sprekelia formosissima.**
— *Hallii:* **Lycoris squamigera.**
— *Johnsonii:* **Hippeastrum Johnsonii.**
— *lutea:* **Sternbergia lutea.**
— *solandri:* probably **Hippeastrum solandriflorum.**
— *vittata:* **Hippeastrum vittatum.**
AMBERBOA. *A. muricata:* **Volutarella muricata.**
AMBROSIA. *A. mexicana:* probably an Artemesia.
AMELANCHIER. *A. alnifolia.
— *Botryapium:* ***A. canadensis;** sometimes applied to **A. oblongifolia.**
—***canadensis,** but the stock is probably **A. lævis.**
—***oblongifolia.**
— *vulgaris:* ***A. rotundifolia.**

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AMMOBIUM. A. alatum.
— *grandiflorum:* **A. alatum grandiflorum.**
AMOMUM. A. Cardamon.
AMORPHA. *A. canescens.
— *fragrans:* ***A. fruticosa,** or an unimportant form of it.
—***fruticosa.**
— *montana:* ***A. glabra.**
— *nana:* ***A. microphylla.**
AMORPHOPHALLUS. A. Rivieri.
AMPELOPSIS. *A. aconitifolia, but often is **A. aconitifolia palmiloba.**
—***cordata.**
— *dumetorum:* **Parthenocissus vitacea.** *A. vitacea.
— *Engelmannii:* **P. quinquefolia Engelmannii:** *A. quinquefolia Engelmannii.
—***** *Henryana:* **P. Henryana.**
—***heterophylla.**
—***humulifolia.**
—***hypoglauca.**
— **lecoides,** but the plant in cultivation is ***A. Watsoniana** (page 3565); the true A. lecoides is not in cultivation.
— *Lowii:* **P. tricuspidata Lowii:** *A. tricuspidata Lowii.
—***megalophylla.**
— *muralis:* **P. quinquefolia murorum:** *A. quinquefolia murorum.
—***** *quinquefolia:* **P. quinquefolia.**
— *stricta:* probably an error for **Cissus striata.**
—***** *Thomsonii:* **P. Thomsonii.**
— *tricolor:* ***A. heterophylla elegans.**
—***** *tricuspidata:* **P. tricuspidata.**
— *Veitchii:* **P. tricuspidata Veitchii:** *A. tricuspidata Veitchii.
—***** *vitacea:* **P. vitacea.**
AMSONIA. *A. Amsonia:* **A. Tabernæmontana.**
— **angustifolia.**
— *salicifolia:* **A. Tabernæmontana.**
— **Tabernæmontana.**
AMYGDALUS. *A. chinensis:* ***Prunus japonica** and ***P. glandulosa** (Cherry-Almonds; sometimes known as "flowering almonds").
—***** *communis:* **P. communis** (Almond).
—***** *Davidiana:* **P. Davidiana.**
—***** *nana:* **P. nana** (Russian Dwarf Almond).
—***** *Persica:* **P. Persica** (Peach).
— *sibirica:* perhaps ***P. Armeniaca sibirica** (Siberian Apricot) or **P. nana** (*A. nana).
—***** *triloba* (Flowering Almond): **P. triloba.**
ANACARDIUM. A. occidentale.
ANACHARIS. *A. canadensis:* **Elodea canadensis.**
ANAGALLIS. *A. grandiflora:* **A. linifolia.**
ANANAS. A. sativus.
ANAPHALIS. A. margaritacea (Antennaria).
ANCHUSA. A. Barrelieri.
— **capensis.**
— **italica.**
— **mysotidiflora.**
— **officinalis.**
ANDROMEDA. *A. arborea:* ***Oxydendrum arboreum.**
— *calyculata:* ***Chamædaphne calyculata.**
— *Catesbæi:* ***Leucothoë Catesbæi.**
— *floribunda:* ***Pieris floribunda.**
— *japonica:* ***P. japonica.**
— *mariana:* ***P. mariana.**
—***polifolia.**
— *speciosa:* ***Zenobia pulverulenta.**
ANDROPOGON. A. argenteus.
ANEMONE. *A. acutiloba:* **Hepatica acutiloba.**
— **apennina.**
— **canadensis.**
— **coronaria.**
— **fulgens.**
— *Hepatica:* **Hepatica triloba.**
— **hortensis.**
— **hupehensis.**
— **japonica.**
— **nemorosa.**
— *Nuttalliana:* **A. patens Nuttalliana.**
— **patens.**
— *pennsylvanica:* **A. canadensis.**
— **Pulsatilla.**
— **sylvestris.**
— **vitifolia.**
ANEMONELLA (Syndesmon is the name under the American Code). **A. thalictroides.**
ANEMONOPSIS. A. macrophylla.
ANGELONIA. A. grandiflora.
ANGOPHORA. *A. intermedia (page 3565).
—***lanceolata.**
ANNONA. A. Cherimola.
— **glabra.**
— **muricata.**
— **reticulata.**
— **squamosa.**
ANOMATHECA. *A. cruenta:* **Lapeyrousia cruenta.**
ANTENNARIA. A. dioica.
— *margaritacea:* **Anaphalis margaritacea.**
ANTHEMIS. *A. arabicus:* **Cladranthus arabicus.**
— **Kelwayi.**
— **nobilis.**
— **tinctoria.**
ANTHERICUM. *A. comosum:* **Chlorophytum comosum.**
— **Liliago.**
— *Liliastrum:* **Paradisea Liliastrum.**
— *vittatum:* **Chlorophytum elatum.**
ANTHURIUM. A. Andræanum.
— **crystallinum.**
— **regale.**
— **Scherzerianum.**
ANTIGONON. *A. leptopus.
ANTIRRHINUM. *A. album:* **A. majus.**
— atrococcineum, delicatum, grandiflorum, luteum, maximum, picturatum, striatum. Apparently all forms of **A. majus.**
APIOS. *A. tuberosa (Glycine Apios in American Code, but not adopted under International Rules).
APIUM. A. graveolens (Celery).
APLECTRUM. A. hyemale.
APONOGETON. *A. distachyon:* **A. distachyus.**
— **fenestralis** (Ouvirandra).
AQUILEGIA. A. akitensis (page 3565).
— **alpina.**
— **cærulea.**
— *californica:* **A. formosa truncata.**
— **canadensis.**
— **chrysantha.**
— **flabellata.**
— **formosa.**
— **glandulosa.**
— **haylodgensis.**
— *Helenæ:* **A. cærulea Helenæ.**
— *Jæschkani:* **A. chrysantha Jæschkanii.**
— *nivea:* **A. vulgaris nivea.**
— *olympica:* **A. vulgaris olympica.**
— **oxysepala.**
— **sibirica.**
— **Skinneri.**
— *truncata:* **A. formosa truncata.**
— *Vervæneana:* **A. vulgaris Vervæneana.**
— **vulgaris.**
ARABIS. A. albida.
— **alpina.**
— **mollis.**
— *rosea:* **A. muralis.**
ARACHIS. A. hypogæa.
ARALIA. *A. Balfouriana:* **Polyscias Balfouriana.**
— *cashmeriana:* **A. cachemirica.**
— *Chabrieri:* **Elæodendron orientale.**
—***chinensis.**
—***cordata.**
— *elegantissima:* **Dizygotheca elegantissima.**
— *filicifolia:* **Polyscias filicifolia.**
— *Guilfoylei:* **Polyscias Guilfoylei.**
— *japonica:* ***Fatsia japonica;** stock probably sometimes ***A. chinensis.**
— *Kerchoveana:* **Dizygotheca Kerchoveana.**
— *mandshurica:* ***A. chinensis mandshurica.**
— *Maximowiczii:* ***Acanthopanax ricinifolium Maximowiczii.**
— *papyrifera:* ***Tetrapanax papyriferum.**
— *pentaphylla:* ***Acanthopanax pentaphyllum.**
—***racemosa.**
— *Sieboldii:* ***Fatsia japonica.**
—***spinosa.**
— *Veitchii:* **Dizygotheca Veitchii.**
ARAUCARIA. *A. Bidwillii.
— *brasiliensis:* ***A. brasiliana.**
—***excelsa.**
—***imbricata.**
— *robusta:* ***A. excelsa robusta.**
ARBUTUS. *A. Menziesii.
—***Unedo.**
ARCHONTOPHŒNIX. A. Alexandræ (Ptychosperma).
— **Cunninghamii** (Ptychosperma).
ARCTOSTAPHYLOS. *A. glauca.
—***tomentosa.**
—***Uva-ursi.**
ARCTOTIS. A. breviscapa.
— **grandis.**
ARDISIA. *A. crenulata.

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ARECA. *A. Baueri:* **Rhopalostylis Baueri.**
— **Catechu.**
— *lutescens:* **Chrysalidocarpus lutescens.**
— *rubra:* **Acanthophœnix rubra.**
— *sapida:* **Rhopalostylis sapida.**
— *Verschaffeltii:* **Hyophorbe Verschaffeltii.**

ARENARIA. *A. cæspitosa:* **A. verna cæspitosa.**
— **grœnlandica.**
— **montana.**

ARENGA. **A. saccharifera.**

ARETHUSA. **A. bulbosa.**

ARGEMONE. **A. grandiflora.**

ARGYREIA. **A. splendens** (page 3566).

ARISÆMA. **A. Dracontium.**
— **triphyllum.**

ARISTOLOCHIA. *A. elegans.**
— **grandiflora.**
— **macrophylla;** in some cases probably designates **A. brasiliensis macrophylla.**
—**Sipho:* **A. macrophylla.**
— *Sturtevantii:* ***A. grandiflora Sturtevantii.**

ARMERIA. *A. alba:* probably **Statice Armeria alba.**
— *alpina:* **S. alpina.**
— *cephalotes:* probably **S. pseudoarmeria,** but possibly **S. mauritanica** is meant in the trade.
— *dianthoides:* **S. plantaginea leucantha.**
— *formosa:* **S. pseudoarmeria.**
— *Laucheana:* **S. Armeria Laucheana.**
— *maritima:* **S. Armeria.**

ARNEBIA. **A. cornuta.**

ARONIA (Malus. Pyrus). ***A. arbutifolia.**
—***atropurpurea.**
— *erythrocarpa:* ***A. arbutifolia.**
—***melanocarpa.**
— *nigra:* ***A. melanocarpa.**

ARRHENATHERUM. *A. bulbosum:* **A. elatius tuberosum.**

ARTEMISIA. **A. Abrotanum.**
— **Absinthium.**
— **Dracunculus.**
— **frigida.**
— *lactiflora:* a white-flowered form of **A. vulgaris.**
— *pedemontana:* **A. lanata.**
— **pontica.**
— **Purshiana.**
— **sacrorum.**
— **Stelleriana.**
— **vulgaris.**

ARTOCARPUS. **A. incisa** (Bread-Fruit).

ARUM. *A. crinitum:* **Helicodiceros muscivorus.**
— *Dracunculus:* **Dracunculus vulgaris.**
— **italicum.**
— **maculatum.**
— **palæstinum.**

ARUNCUS. *A. Aruncus:* **A. sylvester** (Spiræa).
— **astilboides,** but the plant in cultivation is **Astilbe astilboides.**
— **sylvester** (Spiræa).

ARUNDINARIA (Bambusa). ***A. auricoma.**
—***falcata.**
—***Falconeri.**
— *foliis variegatis:* probably ***A. Fortunei.**
—***Hindsii.**
—***japonica.**
—***Simonii.**
—***Veitchii.**

ARUNDO. ***A. Donax.**

ASARUM. **A. arifolium.**
— **canadense.**
— **virginicum.**

ASCLEPIAS. **A. Curassavica.**
— **Hallii.**
— **incarnata.**
— **tuberosa.**

ASIMINA. ***A. triloba.**

ASPARAGUS. **A. asparagoides** (Myrsiphyllum. Florists' Smilax).
— **Cooperi.**
— *Hatcheri:* probably **A. plumosus robustus.**
— **madagascariensis.**
— *medeoloides:* **A. asparagoides.**
— *nanus:* **A. plumosus nanus.**
— **officinalis** (Edible Asparagus).
— **plumosus.**
— **scandens.**
— **Sprengeri.**
— *tenuissimus:* **A. plumosus tenuissimus.**

ASPERULA. *A. azurea:* **A. orientalis.**
— **hexaphylla.**
— **odorata.**

ASPHODELINE. **A. lutea** (Asphodelus).

ASPHODELUS. **A. albus.**
— *luteus:* **Asphodeline lutea.**

ASPIDISTRA. **A. lurida.**

ASPIDIUM. *A. achrostichoides:* **Polystichum acrostichoides.**
— *aculeatum:* **P. aculeatum.**
— *Braunii:* **P. Braunii.**
— *cristatum:* **Dryopteris cristata.**
— *Filix-mas:* **D. Filix-mas.**
— *Goldieanum:* **D. Goldieana.**
— *marginale:* **D. marginalis.**
— *munitum:* **P. munitum.**
— *noveboracense:* **D. noveboracensis.**
— *spinulosum:* **D. spinulosa.**
— *Thelypteris:* **D. Thelypteris.**
— *Tsus-sinense:* **P. Tsus-sinense.**

ASPLENIUM. **A. acrostichoides.**
— **angustifolium.**
— **bulbiferum.**
— *ebeneum:* **A. platyneuron.**
— **Filix-fœmina.**
— **Goringianum.**
— *Nidus-avis:* **A. Nidus** (Neottopteris).
— **platyneuron.**
— *Thelypteris:* **Dryopteris Thelypteris.**
— *thelypteroides:* **A. acrostichoides.**
— **Trichomanes.**

ASTER. **A. acris.**
— **alpinus.**
— **Amellus.**
— **amethystinus.**
— **azureus.**

ASTER, continued.
— *bessarabicus:* **A. Amellus bessarabicus.**
— **Chapmanii.**
— **cordifolius.**
— **corymbosus.**
— **Curtisii.**
— *decorus:* **A. lævis.**
— **ericoides.**
— **formosissimus.**
— **grandiflorus.**
— *himalayensis:* **A. himalaica.**
— **lævis.**
— **lilacinus.**
— **longifolius.**
— **Maackii.**
— **macrophyllus.**
— *Mesa grande:* possibly is Erigeron macranthus.
— **multiflorus.**
— **novæ-angliæ.**
— **novi-belgii.**
— **patens.**
— **puniceus.**
— **ptarmicoides.**
— **Shortii.**
— *speciosus:* **A. alpinus speciosus,** not A. speciosus of botanists.
— **spectabilis.**
— **subcæruleus.**
— **tataricus.**
— **Thomsonii.**
— *Townshendii:* **A. Bigelovii.**
— **Tradescantii.**
— **trinervius.**
— **turbinellus.**
— **umbellatus.**
— **undulatus.**
— **versicolor.**

ASTILBE. **A. Arendsii;** hybrids of **A. Davidii** with other species.
— **astilboides** (Spiræa).
— **chinensis.**
— **Davidii** (Spiræa).
— **grandis.**
— **japonica.**
— **simplicifolia.**

ASTRAGALUS. **A. alopecuroides.**

ASTRANTIA. **A. major.**

ATRIPLEX. **A. hortensis** (Orach).

ATROPA. **A. Belladonna.**

AUBRIETIA. *A. Bougainvillei:* **A. deltoidea Bougainvillei.**
— **deltoidea.**
— *Eyrei:* **A. deltoidea Eyrei.**
— *græca:* **A. deltoidea græca.**
— *Hendersonii:* **A. deltoidea Hendersonii.**
— *Leichtlinii:* **A. deltoidea Leichtlinii.**
— *olympica:* **A. deltoidea olympica.**

AUCUBA. ***A. himalaica.**
— ***japonica.**

AVENA. **A. sterilis.**

AZALEA. ****A. amœna:* Rhododendron obtusum amœnum.**
—***arborescens:* R. arborescens.**
— *calendulacea:* **R. calendulaceum:** ***A. lutea.**
— *canadensis:* **R. canadense:** *Rhodora canadensis.
—***canescens:* R. canescens.**
—***gandavensis:* R. Morteri.**
—***Hinodigiri:* form of R. obtusum.**

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AZALEA, continued.
—**indica:* **R. indicum.**
—**japonica:* **R. japonicum.**
—**Kaempferi:* **R. Kaempferi.**
—**ledifolia:* **R. ledifolium.**
—**lutea:* **R. calendulaceum.**
—**mollis:* **R. sinense**; possibly sometimes misapplied to **R. japonicum.**
—**nudiflora:* **R. nudiflorum.**
—**occidentalis:* **R. occidentale.**
—**pontica:* **R. luteum.**
— *rosmarinifolia:* **R. ledifolium**: *A. ledifolia.
— *rustica:* **R. Morteri** var.: *A. gandavensis.
— *sinensis:* **R. sinense**: *A. mollis.
—**Vaseyi:* **R. Vaseyi.**
—**viscosa:* **R. viscosum.**
—**yodogawa:* **R. poukhanense yodogawa.**

AZARA. ***A. microphylla.**

BACCHARIS. ***B. halimifolia.**

BACTRIS. B. major.

BAMBUSA. *B. Alphonsei:* probably **B. Alphonse Kurri.**
—**argentea.**
— *aurea:* ***Phyllostachys aurea.**
—**aureo-striata.**
— *auricoma:* ***Arundinaria auricoma.**
—**fastuosa.**
— *Fortunei:* ***Arundinaria Fortunei.**
— *Henonis:* ***Phyllostachys Henonis.**
— *nigra:* ***Phyllostachys nigra.**
—**palmata.**
— *Simonii:* ***Arundinaria Simonii.**
— *Veitchii:* ***Arundinaria Veitchii.**
— *viminalis:* ***Phyllostachys ruscifolia.**
— *violescens:* ***Phyllostachys violescens.**
—**vulgaris.**

BAPTISIA. ***B. australis.**
— **tinctoria.**

BARBAREA. B. præcox.
— **vulgaris.**

BARTONIA. *B. aurea:* **Mentzelia aurea**, Baill. (M. Lindleyi is untenable under the rules).

BEGONIA. B. albo-picta.
— *argentea:* **B. maculata.**
— **corallina.**
— **Credneri.**
— *crispa:* **B. manicata crispa.**
— **Erfordii.**
— **gracilis.**
— **Haageana.**
— **metallica.**
— **Rex.**
— *rubra:* **B. coccinea.**
— *Sandersonii:* **B. Digswelliana.**
— **semperflorens.**
— **Thurstonii.**
— *Warscewiczii:* **B. conchæfolia.**
Trade names of horticultural begonias often appear in Latin form.

BELAMCANDA. B. chinensis.

BELLIS. B. perennis.

BENINCASA. *B. cerifera:* **B. hispida.**

BENZOIN. *B. odoriferum:* ***B. æstivale** (Laurus. Lindera).

BERBERIS (see page 3566). ***B. aggregata.**
— *Aquifolium:* ***Mahonia Aquifolium.**
— **brevipaniculata**; perhaps sometimes applied to **B. aggregata.**
—***buxifolia.**
—***canadensis.**
—***Darwinii.**
—***dictyophylla.**
— *dulcis:* ***B. buxifolia**; sometimes the name for **B. vulgaris dulcis.**
— *fascicularis:* ***Mahonia pinnata.**
—***Fendleri.**
—***ilicifolia**, but often misapplied to **B. Neubertii latifolia.**
— *japonica:* ***Mahonia japonica.**
— *nervosa:* ***Mahonia nervosa.**
— *purpurea:* ***B. vulgaris atropurpurea.**
— *Regeliana:* ***B. amurensis japonica** (page 3566).
— *repens:* ***Mahonia repens.**
— *sanguinolenta:* ***B. sinensis.**
—***Sargentiana**; but the plant in cultivation under this name is often **B. Julianæ** (page 3566).
—***Sieboldii.**
—***stenophylla.**
—***Thunbergii.**
***verruculosa.**
—***vulgaris.**
— **Wallichiana** (the plant erroneously in cultivation under this name may be **B. Sargentiana, B. Julianæ, B. Hookeri**, or **B. xanthoxylon** (page 3566).
—***Wilsonæ.**

BERCHEMIA. ***B. racemosa.**

BESSERA. B. elegans.

BETA. B. vulgaris (Beet).

BETONICA. *B. grandiflora:* **Stachys grandiflora.**
— *officinalis:* **Stachys officinalis.**

BETULA. ***B. alba:* B. pubescens**; also includes **B. pendula**, under the trade name *B. alba pendula.
—***fontinalis.**
—***lenta.**
—***lutea.**
—***nigra.**
— *papyracea:* ***B. papyrifera.**
—***papyrifera.**
— **pendula**; *B. alba pendula.
—***populifolia.**
— *purpurea:* the purple-leaved form of either **B. populifolia** or **B. pendula.**
— *rubra:* ***B. nigra.**
— *Youngii:* ***B. alba pendula Youngii.**

BICUCULLA (name not allowed under International Rules). *B. eximia:* **Dicentra eximia.**
— *spectabilis:* **Dicentra spectabilis.**

BIDENS. *B. atrosanguinea:* **Cosmos diversifolius.**
— **dahlioides.**

BIGNONIA. ***B. buccinatoria:** Phædranthus buccinatorius.*
—***capreolata.**
—***grandiflora:* Campsis chinensis.**
—***hybrida:* Campsis hybrida.**
—***radicans:* Campsis radicans.**
—***speciosa:* Clytostoma callistegioides.**

BIGNONIA, continued.
— *Tweediana:* ***B. Unguis-cati.**
—***venusta:* Pyrostegia venusta.**

BIOTA. *B. aurea:* ***Thuja orientalis aurea.**
— *japonica:* ***T. orientalis Sieboldii**; some of the stock in trade is perhaps **T. orientalis gracilis.**
— *orientalis:* ***T. orientalis.**
— *pyramidalis:* ***T. orientalis pyramidalis.**

BLECHNUM. B. brasiliense.
— **occidentale.**

BLETIA. *B. hyacinthina:* **Bletilla hyacinthina.**

BLETILLA. B. hyacinthina (Bletia).

BLUMENBACHIA. B. lateritia (Loasa).

BOCCONIA. B. cordata.
— *japonica:* **B. cordata.**
— **microcarpa.**

BOLTONIA. B. asteroides.
— **latisquama.**

BORAGO. B. officinalis.

BOTRYCHIUM. B. obliquum.
— *ternatum:* **B. obliquum.**
— *virginicum:* **B. virginianum.**

BOUGAINVILLEA. ***B. glabra.**
— *lateritia:* ***B. spectabilis lateritia.**
—***refulgens.**
— *Sanderiana:* ***B. glabra Sanderiana.**
—***spectabilis.**

BOUSSINGAULTIA. B. baselloides.

BOUVARDIA. B. Humboldtii.
— *Jacquinii:* **B. triphylla.**
— **triphylla.**

BRACHYCHITON. B. diversifolium; also perhaps refers to **B. populneum.**

BRACHYCOME. B. iberidifolia.

BRAHEA. *B. filifera:* **Washingtonia filifera.**
— *robusta:* **W. filifera robusta.**

BRASENIA. *B. peltata:* **B. Schreberi.**

BRASSICA. *B. acephala:* **B. oleracea acephala** (Kale).
— **alba** (Sinapis).
— **arvensis** (Sinapis).
— *botrytis:* **B. oleracea botrytis** (Cauliflower).
— **campestris** (Rutabaga).
— *capitata:* **B. oleracea capitata** (Cabbage).
— **chinensis.**
— **japonica** (Sinapis).
— **Napus** (Rape).
— **oleracea.**
— **Pe-tsai** (Brassica Pe-tsai, Bailey, was founded in 1894 on cultivated material. Sinapis pekinensis, Loureiro, 1790, one of the vernacular names of which is Pe-tsai, has been brought over into Brassica as B. pekinensis, Skeels. If B. Pe-tsai, Bailey, and B. pekinensis, Skeels, prove to be identical, the latter name must hold. More than one species may be involved.
— **Rapa** (Turnip).

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BRAUNERIA (the name under the American Code). *B. angustifolia:* **Echinacea angustifolia.**
— *purpurea:* **E. purpurea.**

BRAVOA. B. geminiflora.

BRIZA. *B. geniculata:* **Eragrostis obtusa.**
— *gracilis:* **B. minor.**
— **maxima.**

BRIZOPYRUM. *B. siculum:* **Desmazeria sicula.**

BROMUS. B. brizæformis.
— **macrostachys.**
— **madritensis.**

BROUSSONETIA. *B. papyrifera.

BROWALLIA. *B. elata:* **B. demissa.**
— *Jamesonii:* **Streptosolen Jamesonii.**
— *Roezlii:* **B. grandiflora.**
— **speciosa.**
— **viscosa.**

BRUCKENTHALIA. *B. spiculifolia.

BRUNELLA. A pre-Linnæan spelling of Prunella (which see), and still widely used.

BRYONIA. *B. laciniosa:* **Bryonopsis laciniosa.**

BRYONOPSIS. B. laciniosa (Bryonia).

BUDDLEIA. *B. asiatica.
—***globosa.**
—***intermedia.**
—***japonica.**
—***Lindleyana.**
— *magnifica:* ***B. Davidii magnifica.**
—***officinalis.**
— *variabilis:* ***B. Davidii.**
— *Veitchii:* ***B. Davidii Veitchiana.**

BUPHTHALMUM. *B. cordifolium:* **B. speciosum** (Telekia).
— **salicifolium.**

BUXUS. *B. arborescens:* ***B. sempervirens arborescens.**
—***balearica.**
— *Fortunei:* ***B. japonica.**
— *Handsworthii:* ***B. sempervirens Handsworthii.**
—***japonica.**
— *rotundifolia:* ***B. sempervirens rotundifolia.**
—***sempervirens.**
— *suffruticosa:* ***B. sempervirens suffruticosa.**

CABOMBA. *C. viridifolia:* **C. caroliniana.**

CACALIA. *C. aurea:* probably an Emilia.
— *coccinea:* **Emilia flammea.**

CÆSALPINIA. *C. Gilliesii (Poinciana).
—***C. pulcherrima.**

CALADIUM. *C. esculentum:* **Colocasia antiquorum esculenta.** There are many Latin-named varieties.

CALAMINTHA. *C. alpina:* **Satureia alpina.**

CALAMPELIS. *C. scabra:* **Eccremocarpus scaber.**

CALANDRINIA. C. grandiflora.
— *speciosa:* **C. Menziesii.**
— **umbellata.**

CALATHEA. Usually listed under Maranta, which see.

CALCEOLARIA (the application of the American Code transfers Calceolaria to Ionidium, one of the Violet family; the calceolaria of florists then becomes Fagelia, and the leguminous Fagelia [Vol. III, page 1201] becomes Bolusafra). *C. hybrida:* **C. herbeohybrida.**
— **pinnata;** some of the stock is probably **C. scabiosæfolia.**
— **profusa.**
— *rugosa:* **C. integrifolia.**
— **scabiosæfolia.**
— **Veitchii.**

CALENDULA. C. officinalis.
— *pluvialis:* **Dimorphotheca annua.**
— *Pongei:* **D. annua ligulosa.**

CALIMERIS. C. incisa.

CALLA. *C. æthiopica:* **Zantedeschia æthiopica.**
— *Elliottiana:* **Z. Elliottiana.**
— **palustris.**

CALLICARPA. *C. americana.
—***japonica.**
—***purpurea:** **C. dichotoma** (the tenable name, under the rules, rather than C. purpurea).

CALLIOPSIS. *C. bicolor:* **Coreopsis tinctoria.**
— *cardaminefolia:* **Coreopsis cardaminefolia.**
— *Drummondii:* **Coreopsis Drummondii.**
— *lanceolata:* **Coreopsis lanceolata.**
— *marmorata:* **Coreopsis tinctoria.**
— *nigra:* **Coreopsis tinctoria atropurpurea.**
— *radiata:* **Coreopsis radiata.**
— *tinctoria:* **Coreopsis tinctoria.**

CALLIRHOE. C. involucrata.
— **pedata.**
— *verticillata:* **C. involucrata.**

CALLISTEMON. *C. coccineus (page 3566).
—***Cunninghamii** (page 3566).
— *floribundus:* ***C. lanceolatus.**
— *hybridus* (page 3566).
—***lanceolatus** (Metrosideros).
— *robustus* (page 3566).
— *splendens* (page 3566).
— *viridifolius:* probably **C. salignus viridiflorus.**

CALLISTEPHUS. C. chinensis (China Aster).

CALLITRIS. *C. australis:* **C. rhomboidea.**

CALLUNA. *C. vulgaris (Erica).

CALOCHORTUS. C. flavus (Cyclobothra).

CALONYCTION. C. aculeatum (Ipomœa Bona-Nox).

CALOPOGON. C. pulchellus (Limodorum).

CALTHA. C. palustris.

CALYCANTHUS. *C. floridus.
— *glaucus:* ***C. fertilis glaucus.**

CALYCANTHUS, continued.
— *macrophyllus:* ***C. occidentalis.**
— *præcox:* ***Meratia præcox.**

CALYPSO (under the American Code, Cyatherea replaces this name). *C. borealis:* **C. bulbosa,** Oakes (C. borealis erroneously).

CALYSTEGIA. *C. pubescens:* **Convolvulus japonicus.**

CAMASSIA (Quamasia under American Code). *C. Cusickii.*
— *esculenta:* **C. Quamash.**
— **Leichtlinii.**

CAMELLIA. *C. japonica.
—***Sasanqua.**
— *Thea:* ***Thea sinensis.**

CAMPANULA. C. alliariæfolia.
— *amabilis:* **C. phyctidocalyx.**
— *attica:* **C. drabifolia.**
— **barbata.**
— *calycanthema:* **C. Medium calycanthema.**
— **carpatica.**
— *dahurica:* **C. glomerata dahurica.**
— **glomerata.**
— *grandiflora:* **Platycodon grandiflorum.**
— *grandis:* **C. latiloba.**
— **Grossekii.**
— **lactiflora.**
— **latifolia.**
— **longestyla.**
— *Lorei* (Loreyi): **C. ramosissima.**
— *macrantha:* probably **C. latifolia macrantha,** but perhaps also **C. persicifolia macrantha.**
— **macrostyla.**
— **Medium.**
— **mirabilis.**
— *nobilis.* **C. punctata.**
— **persicifolia.**
— **punctata.**
— **pyramidalis.**
— **rapunculoides.**
— **rhomboidalis.**
— **rotundifolia.**
— *Speculum:* **Specularia Speculum.**
— **Trachelium.**
— *turbinata:* **C. carpatica turbinata.**
— **Van Houttei.**
— **Vidalii.**

CAMPHORA. *C. officinalis:* ***Cinnamomum Camphora.**

CAMPSIS (Bignonia. Tecoma). **C. chinensis: *Bignonia grandiflora.**
— **hybrida: *B. hybrida.**
— **radicans: *B. radicans.**

CAMPTOSORUS. C. rhizophyllus.

CANNA. C. indica.
In garden Cannas the original species are scarcely distinguishable.

CANNABIS. *C. gigantea:* a form of **C. sativa.**

CAPSICUM. C. annuum.
— **frutescens.**

CARAGANA. *C. arborescens.
—***Chamlagu.**
— *frutescens:* ***C. frutex.**
—***microphylla.**

CARDAMINE. C. pratensis.

CARDIOSPERMUM. C. Halicacabum.

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CARDUUS. *C. benedictus:* **Cnicus benedictus.**

CAREX. C. Fraseri.
— Morrowii.

CARICA. *C. Papaya.

CARISSA. *C. grandiflora.

CARPENTERIA. *C. californica.

CARPINUS. *C. americana:* *C. caroliniana.
—*Betulus.
—*caroliniana.

CARUM. C. Carvi (Caraway).

CARYA (Carya, of Nuttall, 1818. Scoria, Rafinesque, 1808, but there is evidence that Hicoria was meant. Hicorius, Raf., 1817. Hicoria, Raf., 1838). C. alba: *Hicoria alba (Mockernut).
— *amara:* C. cordiformis: *H. cordiformis.
— cordiformis: *H. cordiformis.
— glabra (Pignut): *H. glabra.
— laciniosa (Shellbark Hickory): *H. laciniosa.
— ovata: *H. ovata (Shagbark Hickory).
— Pecan: *H. Pecan.
— *porcina:* C. glabra: *H. glabra (Pignut).
— *sulcata:* C. laciniosa: *H. laciniosa (Shellbark Hickory).
— *tomentosa:* C. alba: *H. alba.

CARYOPHYLLUS. See Eugenia.

CARYOPTERIS. *C. Mastacanthus:* *C. incana.

CARYOTA. C. mitis.
— *sobolifera:* C. mitis.
— urens.

CASIMIROA. C. edulis.

CASSANDRA. *C. calyculata:* *Chamædaphne calyculata.

CASSIA. C. artemisioides.
—*corymbosa.
— *floribunda:* *C. corymbosa.
— lævigata.
— marilandica.
— polyantha (page 3566).
— tomentosa.

CASTALIA. See Nymphæa.

CASTANEA. *C. americana:* *C dentata.
—*japonica:* C. crenata.
—*pumila.
—*sativa.
— *vesca:* *C. sativa.

CASTANOPSIS. *C. chrysophylla (see also page 2891 for other species).

CASTILLEJA. C. indivisa.

CASUARINA. *C. Cunninghamiana.
—*equisetifolia.
—*stricta.

CATALPA. *C. bignonioides.
—*Bungei:* C. bignonioides nana (C. Bungei of botanists is a good species, apparently not in the trade although likely to appear).
—*hybrida.
—*Kaempferi:* C. ovata.

CATALPA, continued.
—*ovata.
—*speciosa.

CATANANCHE. *C. bicolor:* C. cærulea bicolor.
— cærulea.

CAULOPHYLLUM. C. thalictroides.

CEANOTHUS. *C. americanus.
—*azureus.
—*hybridus.
—*thyrsiflorus.

CEDRELA. *C. sinensis.

CEDRONELLA. C. cana.

CEDRUS. *C. atlantica.
—*Deodara.
—*Libani.

CELASTRUS. *C. articulatus:* *C. orbiculatus.
—*orbiculatus.
— *punctatus:* *C. orbiculatus punctatus.
—*scandens.

CELOSIA. *C. coccinea:* C. cristata.
— cristata.
— Huttonii.
— *spicata:* perhaps a form of C. cristata, not C. spicata of botanists.

CELSIA. C. Arcturus (page 3566).

CELTIS. *C. australis.
— *crassifolia:* *C. occidentalis crassifolia.
—*mississippiensis.
—*occidentalis.
—*reticulata.

CENTAUREA. C. americana.
— babylonica.
— *candidissima:* C. Cineraria.
— Clementei.
— Cyanus.
— dealbata.
— gymnocarpa.
— imperialis.
— macrocephala.
— montana.
— moschata.
— nigra.
— *odorata:* C. moschata.
— orientalis (page 3567).
— pulcherrima (Ætheopappus).
— ruthenica.
— *suaveolens:* C. moschata.

CENTAURIDIUM. *C. Drummondii:* Xanthisma texanum.

CENTRANTHUS. *C. albus:* name likely to apply to either C. ruber albus or C. macrosiphon albus.
— macrosiphon.
— ruber.

CENTROSEMA. *C. grandiflora:* C. virginianum.

CEPHALANTHUS. *C. occidentalis.

CEPHALARIA. C. alpina.
— tatarica.

CEPHALOTAXUS. *C. drupacea.
—*Fortunei.
—*Harringtonia (Taxus).
— *pedunculata:* *C. Harringtonia.

CERASTIUM. C. Biebersteinii.
— tomentosum.

CERASUS. *C. avium:* *Prunus avium.
— *caproniana:* *P. Cerasus.
— *caroliniana:* P. caroliniana: *Laurocerasus caroliniana.
— *chinensis:* *P. glandulosa and *P. japonica (Cherry-Almonds).
— *ilicifolia:* *P. ilicifolia.
— *integrifolia:* *P. Lyonii.
— *japonica:* *P. subhirtella pendula (Flowering Cherry).
— *Mahaleb:* *P. Mahaleb.
— *Padus:* *P. Padus.
— *pennsylvanica:* *P. pennsylvanica.
— *Rhexi:* *P. Cerasus Rhexii.
— *serotina:* *P. serotina.
— *Sieboldii:* *P. Sieboldii.

CERATONIA. *C. Siliqua.

CERATOSTIGMA. C. plumbaginoides (Plumbago).

CERCIDIPHYLLUM. *C. japonicum.

CERCIS. *C. canadensis.
—*chinensis.
— *japonica:* *C. chinensis.
—*Siliquastrum.

CERCOCARPUS. *C. parvifolius.

CEREUS. *C. nycticalus:* Selenicereus pteranthus.

CERINTHE. C. retorta.

CEROPTERIS. C. sulphurea (Gymnogramma).

CESTRUM. *C. aurantiacum.
—*elegans (Habrothamnus).
—*fasciculatum.
—*nocturnum.
—*Parquii.

CHÆNOMELES. C. japonica (Chæ. Maulei): *Cydonia Maulei.
— lagenaria (the tenable name for the plant generally known as Chæ. japonica; Cy. Maulei now becomes Chæ. japonica. See page 3567). *Cydonia japonica.

CHÆROPHYLLUM. C. bulbosum (Turnip-rooted Chervil).

CHAMÆCERASUS. *C. Albertii:* *Lonicera spinosa Albertii.
— *Maackii:* *Lonicera Maackii.

CHAMÆCYPARIS. *C. Lawsoniana (Cupressus).
— *nutkaensis:* *C. nootkatensis (Cupressus).
—*obtusa.
—*pisifera.
— *sphæroidea:* *C. thyoides.

CHAMÆDAPHNE. *C. calyculata (Andromeda. Cassandra).

CHAMÆLIRIUM. C. luteum.

CHAMÆPEUCE. *C. diacantha:* Cirsium diacantha.

CHAMÆROPS. *C. canariensis:* a form of C. humilis.
—*elegans:* a form of C. humilis.
— *excelsa:* *Trachycarpus excelsa.
— *Fortunei:* *Trachycarpus Fortunei.
—*humilis.
— *nepalensis:* *Trachycarpus Martiana.

CHARIEIS. C. heterophylla (Kaulfussia).

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CHAYOTA. See Sechium.

CHEILANTHES. C. Fendleri.

CHEIRANTHUS. C. Allionii.
— Cheiri.

CHELONE. *C. barbata:* Pentstemon barbatus.
— glabra.
— Lyonii.
— obliqua.

CHENOPODIUM. C. Bonus-Henricus.
— Quinoa.

CHILOPSIS. *C. linearis (the tenable name under the rules, C. saligna being replaced).

CHIMAPHILA. C. maculata.

CHIMONANTHUS. *C. fragrans:* *Meratia præcox.

CHIONANTHUS. *C. virginica.

CHIONODOXA. C. Luciliæ.

CHLIDANTHUS. C. fragrans.

CHLORIS. *C. barbata:* C. polydactyla.
— elegans.

CHLOROPHYTUM. C. comosum (Anthericum).
— elatum (Anthericum).

CHOISYA. *C. ternata.

CHORIZEMA. C. ilicifolium.

CHRYSALIDOCARPUS. C. lutescens (Areca).

CHRYSANTHEMUM. C. arcticum.
— *Burridgianum:* a strain of C. carinatum.
— coccineum (Pyrethrum).
— coronarium.
— corymbosum (Pyrethrum).
— frutescens.
— indicum.
— *inodorum:* Matricaria inodora.
— *japonicum:* C. indicum.
— Leucanthemum.
— maximum.
— multicaule.
— nipponicum.
— Parthenium.
— segetum.
— *sinense:* C. morifolium.
— Tchihatchewii (Pyrethrum).
— *tricolor:* C. carinatum.
— uliginosum (Pyrethrum).

CHRYSOGONUM. C. virginianum.

CHRYSOPHYLLUM. C. Cainito.

CHRYSURUS. *C. aureus:* Lamarckia aurea.
— *cynosurioides:* L. aurea.

CIBOTIUM. C. Schiedei (Cybotium).

CICER. C. arietinum.

CICHORIUM. C. Endivia (Endive).
— Intybus (Chicory).

CIMICIFUGA. C. americana.
— dahurica.
— japonica.
— racemosa.
— *simplex:* C. racemosa simplex.

CINERARIA. *C. grandiflora* and *C. hybrida:* forms or hybrids of Senecio cruentus (Florists' Cineraria).

CINERARIA, continued.
— *maritima:* Senecio Cineraria.
— *stellata:* a race of florists' cinerarias (offshoots of Senecio cruentus).

CINNAMOMUM. *C. Camphora (Camphora officinalis).
—*Cassia.
—*Loureirii.
—*zeylanicum.

CIRSIUM. C. diacantha (Chamæpeuce).

CISSUS (often listed as Vitis. Pages 3482, 3483). *C. capensis.
—*discolor.
—*oblonga.
—*quadrangularis.
—*rhombifolia.
—*striata.

CISTUS. *C. albidus.
—*ladaniferus.
—*laurifolius.
—*monspeliensis.
—*salvifolius.

CITRULLUS. C. Colocynthis (Colocynth).
— vulgaris (Watermelon).

CITRUS. *C. amara:* *C. Aurantium.
—*aurantifolia (Lime).
—*Aurantium (Sour or Seville Orange).
— *Bigaradia:* *C. Aurantium.
— *deliciosa:* *C. nobilis deliciosa (Mandarin Orange).
—*grandis (Grapefruit).
—*Limonia (Lemon).
—*Medica (Citron).
—*nobilis (King Orange).
—*sinensis (Common Orange).
—*trifoliata:* Poncirus trifoliata.
— *unshiu:* *C. nobilis unshiu (Satsuma Orange).

CLADRANTHUS. C. arabicus (Anthemis).

CLADRASTIS. *C. amurensis:* *Maackia amurensis.
—*lutea.
— *tinctoria:* *C. lutea (Virgilia).

CLARKIA. C. elegans.
— pulchella.

CLAYTONIA. C. caroliniana.
— virginica.

CLEMATIS. *C. apiifolia.
—*Armandii.
—*coccinea:* C. texensis.
—*crispa.
— *Davidiana:* *C. heracleæfolia Davidiana.
—*Douglasii.
— *erecta:* C. recta.
—*Flammula.
—*florida.
—*Fremontii.
—*grata.
—*Henryi:* C. Lawsoniana Henryi; a common horticultural variety, but not C. Henryi of botanists.
—*heracleæfolia.
—*indivisa.
—*integrifolia.
—*Jackmanii.
—*lanuginosa.

CLEMATIS, continued.
—*ligusticifolia.
—*montana.
—*orientalis.
—*paniculata.
—*patens.
—*recta.
—*serratifolia.
—*tangutica.
— *tubulosa:* *C. heracleæfolia.
—*Viorna.
—*virginiana.
—*Vitalba.
—*Viticella.

CLEOME. *C. gigantea:* C. spinosa, not C. gigantea of botanists.

CLERODENDRON. *C. trichotomum.

CLETHRA. *C. acuminata.
—*alnifolia.
—*tomentosa.

CLEYERA. *C. japonica.

CLIVIA. C. miniata.

CLYTOSTOMA (Bignonia). C. callistegioides: *Bignonia speciosa.

CNEORUM. *C. tricoccon (see Vol. V, page 2704).

COBÆA. *C. flore-alba:* probably refers to the white-flowered form of C. scandens; also known as *C. alba.*
— *macrostemma:* C. macrostoma.
—*scandens.

COCCINIA. *C. indica:* C. cordifolia.

COCCOLOBA. C. uvifera.

COCOS. *C. australis.
—*Bonnetii,* not known botanically.
—*campestris.
—*Datil.
—*eriospatha.
—*flexuosa.
—*nucifera.
—*plumosa.
—*schizophylla (page 3567).
—*Weddelliana.

CODIÆUM. The proper genus for the horticultural plants known as Croton.

COFFEA. *C. arabica.

COIX. *C. Lacryma:* C. Lacryma-Jobi.

COLCHICUM. C. autumnale.

COLEUS. C. thyrsoideus.
— *Verschaffeltii:* C. Blumei Verschaffeltii.

COLLETIA. C. cruciata.

COLLINSIA. *C. bartsiæ:* probably C. bartsiæfolia.
— bicolor.
— grandiflora.
— *multicolor:* C. bicolor multicolor.
— verna.

COLLOMIA. *C. coccinea:* Gilia coccinea.
— *grandiflora:* Gilia grandiflora.

COLOCASIA. C. antiquorum and var. esculenta (Caladium). See Taro, page 3311.
— neo-guineensis.

COLUTEA. *C. arborescens.

COMMELINA. C. cœlestis.
— *Sellowiana:* C. nudiflora.

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COMPTONIA. *C. asplenifolia.
— *C. peregrina:* *C. asplenifolia.

CONOCLINIUM. *C. cœlestinum:* Eupatorium cœlestinum.

CONVALLARIA. C. majalis (Lily-of-the-Valley).
— *Polygonatum:* probably Polygonatum officinale.

CONVOLVULUS. C. aureus.
— japonicus.
— *major:* Ipomœa purpurea.
— mauritanicus.
— *minor:* C. tricolor.
— *purpureus:* Ipomœa purpurea.
— *splendens:* possibly Argyreia splendens (page 3566).
— tricolor.

COOPERIA. C. Drummondii.
— pedunculata.

COPROSMA. *C. Baueri.
— *Baueriana:* *C. Baueri.

COPTIS. C. trifolia.

CORCHORUS. *C. japonicus:* *Kerria japonica.

CORDIA. *C. Francisci (not spelled Francisi).

CORDYLINE (see Dracæna). C. australis (Dracæna).
— indivisa (Dracæna).

COREOPSIS (Calliopsis). *C. auriculata:* probably C. pubescens, but perhaps means C. auriculata, Linn.
— *bicolor:* C. tinctoria.
— coronata.
— Drummondii.
— *floribunda:* not identified.
— grandiflora.
— lanceolata.
— palmata.
— radiata.
— rosea.
— *senifolia:* C. major.
— tinctoria.
— verticillata.

CORNUS. *C. alba.
—*alternifolia.
—*Amomum.
—*Baileyi.
—*brachypoda; but the plant in cultivation is probably sometimes C. controversa.
—*canadensis.
— *candidissima:* C. racemosa: *C. paniculata.
—*capitata.
— *circinata:* *C. rugosa.
— *elegantissima:* probably *C. mas elegantissima.
—*florida.
— *Gouchaultii:* *C. alba Gouchaultii.
—*Kousa.
—*mas.
— *mascula:* *C. mas.
—*Nuttallii.
—*officinalis.
—**paniculata:* C. racemosa.
—*sanguinea.
— *sericea:* *C. Amomum.
— *sibirica:* *C. alba sibirica.
— *Spaethii:* *C. alba Spaethii.
—*stolonifera.

CORONILLA. *C. Emerus.
— glauca.
— varia.

CORTADERIA. C. argentea (Gynerium).
— *jubata:* C. Quila.

CORYDALIS. C. nobilis.

CORYLOPSIS. *C. spicata.

CORYLUS. *C. americana.
— *atropurpurea:* *C. Avellana atropurpurea.
—*Avellana.
—*maxima.
— *pendula:* *C. Avellana pendula.
—*rostrata.

CORYNOCARPUS. *C. lævigata.

CORYPHA. *C. australis:* Livistona australis.

COSMIDIUM. *C. Burridgeanum:* Thelesperma hybridum.

COSMOS. C. bipinnatus.
— diversifolius (Bidens).
— sulphureus.

COTINUS. C. americanus: *Rhus cotinoides.
— Coggygria: *Rhus Cotinus.

COTONEASTER. *C. acuminata.
— *angustifolia:* *Pyracantha angustifolia.
— *buxifolia:* the plant usually sold under this name is *C. rotundifolia lanata, not C. buxifolia of botanists.
— *crenulata:* *Pyracantha crenulata.
— *Davidiana:* *C. horizontalis.
—*foveolata.
—*Franchetii.
—*frigida.
—*horizontalis.
—*integerrima.
—*microphylla.
—*pannosa.
—*salicifolia.
—*Simonsii.
— *Wheeleri:* the plant cultivated under this name is probably either C. racemiflora orbicularis or C. rotundifolia lanata.

COTYLEDON. C. secunda: Echeveria secunda (but equally correct as Cotyledon).

CRAMBE. C. cordifolia.
— maritima.

CRANIOLARIA. C. annua (Martynia).

CRASSULA. *C. coccinea:* Rochea coccinea.

CRATÆGUS. *C. arkansana.
—*Arnoldiana.
—*Barryana.
—*Carrieri.
—*coccinea: several species may pass under this name; it is difficult to know to what species the Linnæan name C. coccinea should apply.
—*coloradensis (page 3567).
—**cordata:* C. Phænopyrum.
— *crenulata:* *Pyracantha crenulata.

CRATÆGUS, continued.
—*Crus-galli.
—*cuneata.
—*Ellwangeriana.
— *glandulosa:* *C. rotundifolia.
— *Lalandii:* *Pyracantha coccinea Lalandii.
—*macrantha.
—*mollis.
—*monogyna.
—*nigra.
—*nitida.
—*Oxycantha; also misapplied to C. monogyna.
—*prunifolia.
—*punctata.
— *Pyracantha:* *Pyracantha coccinea.
—*tomentosa.

CRESCENTIA. C. Cujete (Calabash).

CRINUM. C. amabile.
— asiaticum.
— fimbriatulum.
— Kirkii.
— longifolium.
— Moorei.
— Powellii.

CROCOSMIA. C. aurea.

CROCUS. C. biflorus.
— susianus.
— vernus.

CROTON. *C. Andreanus:* Codiæum variegatum Andreanum.
— *Bergmanii:* Codiæum variegatum Bergmanii.
— *Cronstadtii:* Codiæum variegatum Cronstadtii (proper spelling is not Cronstadii).
— *edmontonensis:* Codiæum variegatum edmontonense.
— *Eversianus:* Codiæum variegatum Eversianum.
— *fuscatus:* Codiæum variegatum fuscatum.
— *inimitabilis:* Codiæum variegatum inimitabile.
— *maculatus:* Codiæum variegatum maculatum.
— *musaicus:* Codiæum variegatum musaicum.
— *punctatus:* Codiæum variegatum punctatum.
— *Reedii:* Codiæum variegatum Reidii.
— *superbus:* Codiæum variegatum superbum.
— *Thompsonii:* Codiæum variegatum Thomsonii.
The following trade-names are probably horticultural forms of Codiæum variegatum: Bausei, brilliantissimus, Chartieri, Craigii, delicatissimus, Leonii, Mortii, Pucciana, Wardelii, and others.

CRUCIANELLA. C. stylosa.

CRYPTOGRAMMA. C. acrostichoides.

CRYPTOMERIA. *C. elegans:* *C. japonica elegans.
—*japonica.

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CUCUMIS. *C. acutangulus:* **Luffa acutangula.**
— **Anguria** (Gherkin).
— *erinaceus:* **C. dipsaceus.**
— *flexuosus:* **C. Melo flexuosus.**
— *grossulariæformis:* **C. Anguria.**
— **Melo** (Melon).
— *odoratissimus:* **C. Melo Dudaim.**
— *perennis:* **Cucurbita fœtidissima.**
— **sativus** (Cucumber).

CUCURBITA. **C. fœtidissima** (Cucumis).
— **maxima.**
— **moschata.**
— **Pepo.**

CUNNINGHAMIA. *C. sinensis:* ***C. lanceolata.**

CUPHEA. *C. compacta:* **C. miniata compacta.**
— *eminens:* **C. micropetala.**
— **hyssopifolia.**
— **miniata.**
— *platycentra:* **C. ignea.**
— **purpurea.**
— *Roezlii:* **C. Hookeriana** (page 3567).
— *strigulosa:* **C. cyanea,** not C. strigulosa of botanists.
— *tricolor:* **C. jorullensis** (page 3567).

CUPRESSUS. ***C. arizonica.**
—***Benthamii.**
— *elegans:* ***C. Benthamii Knightiana.**
— *excelsa:* ***C. Benthamii.**
—***funebris.**
—**glauca:* either **C. Goveniana glauca** or **C. lusitanica.**
—***Goveniana.**
—***guadalupensis.**
— *horizontalis:* ***C. sempervirens horizontalis.**
— *Knightiana:* ***C. Benthamii Knightiana.**
— *Lambertiana:* ***C. macrocarpa Lambertiana.**
— *Lawsoniana:* ***Chamæcyparis Lawsoniana.**
—***lusitanica.**
—***Macnabiana.**
—***macrocarpa.**
— *majestica:* ***C. torulosa majestica.**
— *nutkaensis:* ***Chamæcyparis nootkatensis.**
— *pyramidalis:* ***C. sempervirens stricta,** Ait. (rather than C. sempervirens fastigiata).
—***sempervirens.**
—***torulosa.**

CYBOTIUM. *C. Schiedei:* **Cibotium Schiedei.**

CYCAS. **C. revoluta.**

CYCLAMEN. **C. europæum.**
— *giganteum:* **C. persicum giganteum.**
— *hederæfolium:* probably **C. persicum,** but possibly **C. neapolitanum.**
— *latifolium:* **C. persicum.**
— **persicum.**
— **repandum.**

CYCLOBOTHRA. *C. flava:* **Calochortus flavus.**

CYCLOPHORUS. **C. Lingua** (Niphobolus).

CYDONIA. *C. alba:* **Chænomeles lagenaria** var. (page 3567) (C. japonica of literature): ***Cydonia japonica alba.**
—***japonica:* Chæn. japonica but more correctly **Chæn. lagenaria** (page 3567).
—***Maulei:* Chæn. Maulei of literature but more correctly **Chæn. japonica** (page 3567).
—***oblonga** (Quince).
— *umbilicata:* Chæn. japonica umbilicata, but more correctly **Chæn. lagenaria umbilicata:** ***Cy. japonica umbilicata.**
— *vulgaris:* ***C. oblonga.**

CYNANCHUM. **C. acuminatifolium** (Vincetoxicum).

CYNARA. **C. Cardunculus** (Cardoon).
— **C. Scolymus** (Artichoke).

CYNOGLOSSUM. *C. linifolium:* **Omphalodes linifolia.**
— **nervosum** (page 3567).

CYPERUS. **C. adenophorus** (page 3567).
— **alternifolius.**
— **esculentus** (Chufa).
— **Papyrus** (Papyrus).

CYPHOMANDRA. **C. betacea.**

CYPRIPEDIUM. **C. acaule.**
— *hirsutum:* **C. reginæ** (known also as C. spectabile).
— **parviflorum.**
— **pubescens.**
— **Reginæ.**
— *spectabile:* **C. reginæ** (C. spectabile is not tenable).

CYRTOMIUM. **C. caryotideum.**
— **falcatum.**
— **Fortunei.**
— **Rochfordianum;** a variation of **C. falcatum.**

CYSTOPTERIS. **C. bulbifera.**
— **fragilis.**

CYTISUS. *C. albus.* Name applied to different plants; likely to be **C. leucanthus** or **C. multiflorus,** or possibly **C. purpureus albus, C. præcox** or **C. scoparius albus.**
— *alpinus:* ***Laburnum alpinum.**
— *Andreanus:* ***C. scoparius Andreanus.**
—***canariensis.**
— *candicans:* ***C. monspessulanus.**
—***fragrans.**
— *hispanicus:* ***Genista hispanica.**
— *Laburnum:* **Laburnum anagyroides:** ***L. vulgare.**
—***multiflorus** (Genista).
—***nigricans.**
—***præcox.**
—***racemosus;** but the plant in cultivation is perhaps **C. maderensis magnifolius.**
— *schipkaensis:* ***C. leucanthus schipkaensis.**
—***scoparius.**
—***sessilifolius.**
—***triflorus.**
— *Watereri:* ***Laburnum Watereri.**

DACTYLIS. **D. glomerata.**

DÆMONOROPS. **D. fissus** (page 3568).

DAHLIA. *D. arborea:* **D. excelsa.**
— **coccinea.**
— **excelsa.**
— **Juarezii.**
— *variabilis:* **D. rosea.**

DALIBARDA. **D. repens.**

DAPHNE. ***D. Cneorum.**
— *Fioniana:* ***D. oleoides Fioniana.**
—***Genkwa.**
—***Mezereum.**
—***odora.**
—***oleoides.**

DAPHNIPHYLLUM. ***D. macropodon.**

DARLINGTONIA. **D. californica.**

DASYLIRION. **D. acrotriche.**
— **glaucophyllum.**
— **graminifolium.**
— *Parryi:* **Nolina Parryi.**
— *quadrangulatum:* **D. longissimum.**
— **serratifolium.**
— **Wheeleri.**

DATURA. **D. arborea** (Brugmansia).
— **cornigera.**
— *cornucopia:* **D. fastuosa.**
— **humilis.**
— **meteloides.**
— **sanguinea.**

DAUCUS. **P. Carota** (Carrot).

DAVALLIA. *D. tenuifolia:* **Odontosoria chinensis.**

DECKENIA (Deckeria). **D. nobilis** (page 3568).

DECUMARIA. ***D. barbara.**

DEERINGIA. *D. celosioides:* ***D. baccata.**

DELPHINIUM. **D. Ajacis.**
— *Barlowii:* **D. hybridum Barlowii.**
— **Brunonianum.**
— **cardinale.**
— **cardiopetalum.**
— **cashmerianum.**
— **caucasicum.**
— *chinense:* **D. grandiflorum chinense.**
— **Consolida.**
— **elatum.**
— **formosum.**
— **grandiflorum.**
— **hybridum.**
— **Maackianum.**
— **Moerheimei.**
— **nudicaule.**
— **speciosum** (page 3568).
— **Zalil.**
Many Delphinium names, as D belladonna, are of garden forms.

DENDRIUM (American Code name). *D. buxifolium:* ***Leiophyllum buxifolium.**
— *prostratum:* ***L. buxifolium prostratum.**

DENDROCALAMUS. **D. latifolius.**

DENDROMECON. **D. rigidum.**

DENDROPANAX. ***D. japonicum** (see note under Acanthopanax)

DENNSTÆDTIA. **D. cicutaria** (Sitolobium).
— **punctilobula** (Dicksonia).

DENTARIA. **D. diphylla.**

DESMAZERIA. **D. sicula** (Brisopyrum).

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DESMODIUM. *D. bicolor:* ***Lespedeza bicolor.**
—******japonicum:* **L. japonica.**
—******penduliflorum:* **L. formosa,** Koehne (L. Sieboldii not tenable under the rules).

DEUTZIA. *D. candidissima:* ***D. scabra candidissima.**
— *corymbiflora:* ***D. setchuenensis corymbiflora.**
— *crenata:* ***D. scabra crenata.**
—***discolor.**
— *Fortunei:* ***D. scabra Fortunei.**
—***gracilis.**
—***Lemoinei.**
—***myriantha.**
—***parviflora.**
—***scabra.**
—***Schneideriana.**
—***Vilmorinæ.**
— *Watereri:* ***D. scabra Watereri.**

DIANTHUS. *D. atrorubens:* **D. carthusianorum.**
— **barbatus.**
— **cæsius.**
— **Caryophyllus** (Carnation).
— **chinensis.**
— **cruentus.**
— **deltoides.**
— **diadematus.**
— **glacialis.**
— *Heddewigii:* **D. chinensis Heddewigii.**
— **imperialis.**
— *laciniatus:* **D. chinensis laciniatus.**
— **latifolius.**
— **marginatus** (page 3568).
— *neglectus:* **D. glacialis neglectus.**
— **plumarius.**
— *punctatus:* a form of **D. Caryophyllus,** not D. punctatus of botanists.
— *scoticus:* **D. plumarius.**
— *Seguieri:* **D. chinensis asper.**
— **semperflorens;** some of the stock is probably **D. plumarius semperflorens.**
Latin names of Dianthus are likely to represent garden forms, as albus plenus, mirabilis, multiflorus, nanus, and others.
— **superbus.**

DIASCIA. D. Barberæ.

DICENTRA (Bicuculla). **D. canadensis.**
— **chrysantha.**
— **Cucullaria.**
— **eximia.**
— **formosa.**
— **spectabilis** (Dielytra).

DICKSONIA. *D. punctilobula:* **Dennstædtia punctilobula.**

DICTAMNUS. D. albus.
— *caucasicus:* **D. albus caucasicus.**
— *Fraxinella:* **D. albus.**
— *ruber:* **D. albus ruber.**

DIDISCUS. *D. cærulea:* **Trachymene cærulea.**

DIEFFENBACHIA. D. magnifica.
— **splendens.**

DIELYTRA. *D. spectabilis:* **Dicentra spectabilis.**

DIERVILLA (Weigela). *D. amabilis:* the plant in cultivation is likely to be either **D. florida** or **D. coræensis,** probably the former: *****Weigela amabilis.
— *candida:* **D. hybrida candida: ***W. candida.
— *Desboisii:* **D. hybrida Desboisii: ***W. Desboisii.
— **floribunda: ***W. floribunda.
— **florida: ***W. rosea.
— *Hendersonii:* **D. hybrida Hendersonii: ***W. Hendersonii.
— **hybrida: ***Weigela hybrida.
— **japonica: ***W. japonica.
— *Lavallei:* **D. hybrida Lavallei: ***W. Lavallei.
— **Lonicera: ***D. trifida.
— *lutea:* the plant in the trade under this name is declared to be ***D. sessilifolia.**
—***rivularis.**
— *rosea:* **D. florida: ***W. rosea.
—***sessilifolia.**
— *Steltzneri:* **D. hybrida Steltzneri: ***W. Steltsneri.
—******trifida:* **D. Lonicera.**
— *Van Houttei:* **D. hybrida Van Houttei: ***W. Van Houttei.
— *Verschaffeltii:* **D. hybrida Verschaffeltii: ***W. Verschaffeltii.

DIGITALIS. *D. alba:* probably **D. purpurea alba.**
— **ambigua.**
— *gloxiniæflora:* **D. purpurea gloxiniæflora.**
— *grandiflora:* **D. ambigua.**
— **lanata.**
— **maculata.**
— *monstrosa:* **D. purpurea monstrosa.**
— **purpurea.**
— **sibirica.**

DIMORPHANTHUS. *D. mandschuricus:* ***Aralia chinensis mandschurica.**

DIMORPHOTHECA. D. annua (Calendula).
— **aurantiaca.**
— **sinuata.**

DIONÆA. D. muscipula.

DIOSCOREA. D. alata.
— **Batatas.**
— **bulbifera.**

DIOSMA. D. ericoides.
— *purpurea:* usually **Agathosma villosa,** but sometimes **A. Ventenatiana.**

DIOSPYROS. *D. Kaki.
—***Lotus.**
—***virginiana.**

DIOTIS. D. candidissima (Santolina).

DIPLADENIA. D. splendens.

DIPSACUS. D. fullonum (Teasel).

DIRCA. * D. palustris.

DIZYGOTHECA. D. elegantissima (Aralia).
— **Kerchoveana** (Aralia).
— **Veitchii** (Aralia. Panax).

DODECATHEON. D. Clevelandii.
— **Hendersonii.**

DODECATHEON, continued.
— **Jeffreyi.**
— **Media.**
— **radicatum.**

DODONÆA. *D. cuneata.

DOLICHOS. *D. biflorus.
—***giganteus:** a form of **D. Lablab.**
— *japonicus:* **Pueraria hirsuta: *P.** Thunbergiana.
—***Lablab.**
—***lignosus.**
— *sesquipedalis:* ***Vigna sesquipedalis.**

DORONICUM. D. austriacum.
— **caucasicum.**
— **Clusii.**
— *excelsum:* **D. plantagineum excelsum.**
— **magnificum.**
— **plantagineum.**

DRABA. *D. androsacea:* **D. fladnizensis.**

DRACÆNA. *D. amabilis:* **Cordyline amabilis,** a form of **C. terminalis.**
— *australis:* **C. australis.**
— *Baptistii:* **C. Baptistii,** a form of **C. terminalis.**
— **deremensis.**
— **Draco.**
— **fragrans.**
— **Godseffiana.**
— **Goldieana.**
— *imperialis:* **C. imperialis,** a form of **C. terminalis.**
— *indivisa:* **C. indivisa;** but often applied to **C. australis.**
— **Knerkii,** a form of **D. fragrans.**
— *Lindenii:* **D. fragrans Lindenii.**
— *Massangeana:* **D. fragrans Massangeana.**
— **Rothiana.**
— **Sanderiana.**
— **Shepherdii,** unknown botanically.
— *terminalis:* **Cordyline terminalis.**
— *Veitchii:* **C. australis Veitchii.**
— *Youngii:* **C. Youngii,** a form of **C. terminalis.**
Other Dracæna names are in the trade, probably forms of species of Cordyline, as Albertii, Doucetii (C. australis Doucetiana), lineata (Cordyline terminalis) Parrei, Storyi, and others.

DRACOCEPHALUM. *D. argunense:* **D. Ruyschiana.**
— **grandiflorum.**
— **Moldavica.**
— **Ruyschiana.**

DRACUNCULUS. D. vulgaris (Arum).

DROSERA. D. filiformis.
— **rotundifolia.**

DRYOPTERIS. Accepted name for certain species listed under Aspidium.
— **hirtipes** (Nephrodium).

DUCHESNEA. D. indica (Fragaria).

DURANTA. D. Plumieri.

ECBALLIUM. E. Elaterium (Momordica).

ECCREMOCARPUS. E. scaber (Calampelis).

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ECHEVERIA (see Cotyledon). *E. agavoides:* **Cotyledon agavoides** (but equally correct as **E. agavoides**).
— *metallica:* **E. gibbiflora metallica.**
— **secunda** (Cotyledon).

ECHINACEA (Brauneria). **E. angustifolia.**
— *intermedia:* **E. purpurea serotina.**
— **purpurea.**

ECHINOCACTUS. *E. viridiflorus:* **Echinocereus viridiflorus.**

ECHINOCEREUS. **E. viridiflorus** (Echinocactus).

ECHINOCYSTIS. **E. lobata.**

ECHINOPS. **E. bannaticus.**
— **exaltatus.**
— **humilis.**
— **Ritro.**
— **sphærocephalus.**

ECHIUM. **E. fastuosum.**

EDGEWORTHIA. ***E. Gardneri.**
— *papyrifera:* ***E. chrysantha.**

EICHHORNIA. **E. azurea.**
— **crassipes.**

ELÆAGNUS. ***E. angustifolia.**
—***argentea.**
— *aurea:* ***E. pungens variegata.**
— *edulis:* **E. multiflora:** ***E. longipes.**
—**longipes:* **E. multiflora.**
—***macrophylla.**
— **multiflora.** ***E. longipes.**
—***pungens.**
— *reflexa:* ***E. pungens reflexa.**
— *Simonii:* ***E. pungens Simonii.**
—***umbellata.**

ELÆIS. **E. guineensis.**

ELÆODENDRON. **E. orientale** (Aralia Chabrieri).

ELEUSINE. *E. barcinonensis:* **E. tristachya.**
— **coracana.**
— **indica.**

ELODEA. **E. canadensis** (Anacharis).

ELSHOLTZIA. **E. cristata.**
—***Stauntonii.**

ELYMUS. **E. arenarius.**
— **giganteus** (page 3568).
— **glaucus.**

EMILIA. *E. sonchifolia:* **E. flammea** (Cacalia).

EMMENANTHE. **E. penduliflora.**

ENKIANTHUS. ***E. campanulatus.**
— *japonicus:* ***E. perulatus.**

EOMECON. **E. chionantha.**

EPHEDRA. ***E. altissima.**

EPIGÆA. ***E. repens.**

EPILOBIUM. **E. angustifolium.**
— **hirsutum.**

EPIMEDIUM. **E. alpinum.**
— *colchicum:* **E. pinnatum colchicum.**
— *diphyllum:* **Aceranthus diphyllus.**
— **macranthum.**
— **Musschianum.**
— *niveum:* **E. macranthum niveum.**
— *violaceum:* **E. macranthum violaceum.**

EPIPACTIS: *E. pubescens:* **Goodyera pubescens.**

EPIPHYLLUM. *E. Makoyanum:* **Schlumbergera Russelliana.**
— *truncatum:* **Zygocactus truncatus.**

ERAGROSTIS. **E. abyssinica.**
— **amabilis** (Poa).
— *elegans:* **E. interrupta.**
— **geniculata** (Brisa).
— **maxima.**
— **minus.**
— **obtusa.**

ERANTHIS. **E. hyemalis.**

EREMURUS. **E. himalaicus.**
— **robustus.**
— **turkestanicus** (page 3568).

ERIANTHUS. **E. Ravennæ.**

ERICA. ***E. carnea.**
—***ciliaris.**
—***cinerea.**
— *Mackaii:* supposed to be a hybrid of E. ciliaris × E. Tetralix.
—***mediterranea.**
—***melanthera.**
—***persoluta.**
—***stricta.**
—***Tetralix.**
—***vagans.**
— *vulgaris:* ***Calluna vulgaris.**
— *Willmoreana:* ***E. Wilmorei.**

ERIGERON. **E. alpinus.**
— **aurantiacus.**
— *bellidifolius:* **E. pulchellus.**
— **glabellus.**
— **glaucus.**
— *grandiflorus:* **E. speciosus grandiflorus,** not E. grandiflorus of botanists.
— *intermedius:* not identified.
— **mucronatus** (Vittadinia).
— **multiradiatus.**
— **speciosus** (Stenactis).
— *umbellatus:* not identified.

ERINUS. **E. alpinus.**

ERIOBOTRYA. ***E. japonica** (Loquat. Photinia).

ERLANGEA. **E. tomentosa.**

ERODIUM. **E. cicutarium.**
— **Manescavii.**
— **moschatum.**

ERYNGIUM. **E. alpinum.**
— **amethystinum.**
— **cœlestinum:** unknown botanically; possibly **E. amethystinum.**
— **giganteum.**
— **hybridum.**
— **maritimum.**
— **Oliverianum.**
— **planum.**
— *yuccæfolium:* **E. aquaticum.**

ERYSIMUM. *E. arkansanum:* **E. asperum arkansanum.**
— **ochroleucum.**
— **Perofskianum.**
— **pulchelium.**

ERYTHEA. **E. armata.**
— **Brandegeei.**
— **edulis.**
— **elegans.**

ERYTHRÆA. This genus should take the name Centaurium; names little known in the trade.

ERYTHRINA. **E. Crista-galli.**

ERYTHRONIUM. **A. albidum.**
— **americanum.**
— **californicum.**
— **citrinum.**
— *giganteum:* **E. grandiflorum.**
— **grandiflorum.**
— **Hartwegii.**
— **Hendersonii.**
— **purpurascens.**
— **revolutum.**

ESCALLONIA. *E. Berteriana:* ***E. pulverulenta.**
—***leucantha.**
—***montevidensis.**
— *Philippiana:* ***E. virgata.**
— *rosea:* not known botanically.
— *rubra:* ***E. rubra glabriuscula,** not E. rubra of botanists.
—***virgata.**

ESCHSCHOLTZIA. *E. alba:* **a** white form of **E. californica.**
— *aurantiaca:* **a** form of **E. californica.**
— **californica.**
— *crocea:* **E. californica crocea.**
— *Douglasii:* **E. californica Douglasii.**
— *maritima:* the cultivated plant is a form of **E. californica,** not E. maritima of botanists.
— **tenuifolia.**
— *Thorburnii:* **a** form of **E. californica.**

EUCALYPTUS. ***E. alpina.**
—***amygdalina.**
— *angulosa:* ***E. incrassata angulosa.**
—***bicolor.**
—***Bosistoana.**
—***botryoides.**
— *cajaputea:* ***E. odorata.**
—***calophylla.**
— *citriodora:* ***E. maculata citriodora.**
—***coriacea.**
—***cornuta.**
—***corynocalyx.**
—***crebra.**
—***diversicolor.**
—***ficifolia.**
—***globulus.**
—***Gunnii.**
—***hemiphloia.**
—***incrassata.**
—***Lehmannii.**
—***leucoxylon.**
—***macrorhyncha.**
—***maculata.**
—***mellidora.**
—***Muelleriana.**
—***obliqua.**
—***occidentalis.**
— *pauciflora:* ***E. coriacea.**
—***odora.**
—***piperita.**
—***polyanthemos.**
—***resinifera.**
—***robusta.**
—***rostrata.**
—***rudis.**
—***siderophloia.**
—***sideroxylon.**
—***Stuartiana.**
—***tereticornis.**
—***viminalis.**
—***virgata.**

EUCHARIDIUM. **E. grandiflorum.**

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EUCHARIS. *E. amazonica:* **E. grandiflora.**
EUCHLÆNA. **E. mexicana.**
EUGENIA. ***E. apiculata** (Myrtus).
— **E. aromatica** (Clove); by some recent botanists separated as Caryophyllus aromaticus.
— **jambolana;** by some recent authors separated as Syzygium jambolanum.
— **Jambos.**
— *Michelii:* ***E. uniflora.**
—***microphylla.**
—***myrtifolia.**
— **operculata:** correctly placed either here or as Syzygium operculatum.
—***uniflora.**
EULALIA. *E. gracillima:* **Miscanthus sinensis gracillimus.**
— *japonica:* **M. sinensis.**
— *variegata:* **M. sinensis variegatus.**
— *zebrina:* **M. sinensis zebrinus.**
EUONYMUS: See Evonymus.
EUPATORIUM. *E. ageratoides:* **E. urticæfolium.**
— **album.**
— **aromaticum.**
— **cœlestinum.**
— *Fraseri:* **E. aromaticum melissoides.**
— **glechonophyllum** (Ageratum).
— **Lasseauxii** (Ageratum).
— **micranthum** (Ageratum).
— **perfoliatum**
— **purpureum.**
— **serotinum** (page 3568).
— **urticæfolium.**
EUPHORBIA. **E. coroliata.**
— **Cyparissias.**
— **fulgens.**
— **heterophylla.**
— **marginata.**
— *polychroma:* **E. epithymoides.**
— **pulcherrima.** *Poinsettia pulcherrima.
— **splendens.**
— *variegata:* **E. marginata.**
EURYA. *E. latifolia:* **E. japonica.**
EUSTOMA. **E. Russellianus** (Lisianthus).
EUTOCA. *E. multiflora:* **Phacelia linearis.**
— *viscida:* **P. viscida.**
EVONYMUS. (The preference for Evonymus over Euonymus lies in this use of the word by Linnæus. The former is now generally accepted on the continent of Europe and by some American botanists, as in Gray's Manual. A comparable case is the spelling Zanthoxylum rather than Xanthoxylum. The American Joint Committee on Horticultural Nomenclature adopts the spelling *Euonymus. Some treat the name as feminine and others as masculine.)
— **alata:** *Euonymus alatus.
— **americana:** *Euon. americanus.
— **atropurpurea:** *Euon. atropurpureus; sometimes misapplied to **E. europæa atropurpurea.**

EVONYMUS, continued.
— **Bungeana:** *Euon. Bungeanus.
— *Carrierei:* ***Euon. radicans Carrierei.**
— **europæa:** *Euon. europæus.
— **japonica:** *Euon. japonicus.
— *kewensis:* **E. radicans minima:** *Euon. radicans mininus.
— **latifolia:** *Euon. latifolius.
— **nana;** but the plant in cultivation may be **E. europæa nana:** *Euon. europæus nanus.
— **obovata:** *Euon. obovatus.
— **radicans.**
— **radicans reticulata:** *Euon. radicans reticulatus.
— **Sieboldiana:** The true E. Sieboldiana is not introduced; the plants cult. under this name are **E. Bungeana semipersistens, E. patens,** or **E yedoensis.**
— *vegeta:* **E. radicans vegeta:** *Euon. radicans vegetus.
EXACUM. **E. affine.**
EXOCHORDA. ***E. Giraldii.**
—****grandiflora:** **E. racemosa.**
— *Wilsonii:* ***E. Giraldii Wilsonii.**

FABIANA. ***F. imbricata.**
FAGOPYRUM. **F. esculentum** (Buckwheat).
— **tataricum** (India-Wheat).
FAGUS. ****F. americana:* F. grandifolia** (American Beech).
— *ferruginea:* **F. grandifolia:** *F. americana.
—***sylvatica** (European Beech, purple-leaved and weeping forms).
FARFUGIUM. *F. argenteum:* **Ligularia Kaempferi argenteus.**
— *grande:* **L. Kaempferi aureomaculatus.**
FATSIA. ***F: japonica** (Aralia).
— *papyrifera:* ***Tetrapanax papyriferum** by preference, although by many retained in Fatsia.
FEIJOA. **F. Sellowiana.**
FELICIA. **F. amelloides** (Agathæa).
FENZLIA. *F. dianthiflora:* **Gilia dianthoides.**
FERULA. **F. communis.**
FESTUCA. **F. elatior.**
— **glauca.**
FICUS. ***F. altissima.**
—***Carica** (Fig).
—***elastica.**
— *lutescens:* ***F. diversifolia.**
—***macrophylla.**
—***pandurata.**
—***pumila.**
— *repens:* ***F. pumila.**
—***rubiginosa.**
— **ulmifolius** (page 3568).
— **utilis** (page 3568).
FILARIA (misspelling). See Phillyrea.
FILIPENDULA (see Spiræa and Ulmaria.) **F. camtschatica.**
— **hexapetala.**
— **purpurea.**
— **rubra.**
— **Ulmaria.**
FITTONIA. **F. argyroneura.**

FORSYTHIA. *F. Fortunei:* ***F. suspensa Fortunei.**
—***intermedia.**
— *Sieboldii:* ***F. suspensa Sieboldii.**
—***suspensa.**
—***viridissima.**
FRAGARIA. **F. chiloensis.**
— *indica:* **Duchesnea indica.**
— **mexicana.**
— **vesca.**
— **virginiana.**
FRANCOA. **F. ramosa.**
FRAXINUS. *F. alba:* ***F. americana.**
—***americana.**
— *aurea:* ***F. excelsior aurea.**
—***excelsior.**
—***lanceolata.**
— *lentiscifolia:* ***F. rotundifolia.**
—***mandschurica.**
—***nigra.**
—***oregona.**
—***Ornus.**
—***pennsylvanica.**
— *pubescens:* ***F. pennsylvanica.**
—***quadrangulata.**
—***rotundifolia.**
— *sambucifolia:* ***F. nigra**
— *viridis:* ***F. lanceolata.**
FREESIA. *F. alba:* **F. refracta alba.**
— **refracta.**
FREMONTIA. ***F. californica.**
FRITILLARIA. **F. Imperialis.**
— **liliacea.**
— **meleagris.**
FUCHSIA. *F. conica:* **F. magellanica conica.**
— *globosa:* **F. magellanica globosa.**
— *gracilis:* **F. magellanica gracilis.**
— *hybrida:* **F. speciosa.**
— **magellanica.**
— **procumbens.**
— *Riccartonii:* **F. magellanica Riccartonii.**
— **speciosa.**
— **triphylla.**
FUNKIA. *F. alba:* **Hosta plantaginea.**
— *aurea:* variegated forms of various species of Hosta.
— *cærulea:* **H. cærulea.**
— *Fortunei:* **H. Fortunei,** commonly cultivated as F. Sieboldiana.
— *gigantea:* **H. Fortunei gigantea.**
— *grandiflora:* **H. plantaginea grandiflora.**
— *japonica:* usually **H. plantaginea,** but may be **H. lancifolia.**
— *lanceolata:* **H. cærulea.**
— *lancifolia:* **H. lancifolia.**
— *ovata:* **H. cærulea.**
— *robusta:* **H. Fortunei robusta.**
— *Sieboldiana:* **H. Sieboldiana,** but much of the stock is **H. Fortunei.**
— *subcordata:* **H. plantaginea.**
— *undulata:* **H. lancifolia undulata.**
— *variegata:* variegated forms of various species of Hosta.

GAILLARDIA. **G. amblyodon.**
— **aristata.**
— *grandiflora:* **G. aristata.**
— **kermesina;** a form of G. aristata.
— **Lorenziana;** a form of G. pulchella picta.

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GAILLARDIA, continued.
— *maxima:* **G. aristata.**
— *picta:* **G. pulchella picta.**
GALANTHUS. G. nivalis.
GALAX. *G. aphylla.
GALEGA. *G. bicolor;* probably a form of G. officinalis (page 3568).
— *Hartlandii:* **G. officinalis Hartlandii.**
— **officinalis.**
GALEORCHIS. See Orchis.
GALIUM. G. boreale.
GALTONIA. G. candicans (Hyacinthus).
GAMOLEPIS. G. Tagetes.
GARCINIA. G. Mangostana (Mangosteen).
GARDENIA. **G. florida:* G. jasminoides.
—**Fortunei:* G. jasminoides Fortuniana.
—**radicans:* G. jasminoides.
—*Veitchii; probably a form of G. jasminoides.
GARRYA. *G. elliptica.
GAULTHERIA. *G. procumbens.
—*Shallon.
GAURA. G. Lindheimeri.
GAYLUSSACIA. *G. frondosa.
— *resinosa:* *G. baccata.
—*ursina.
GAZANIA. G. longiscapa.
— splendens.
GELSEMIUM. *G. sempervirens.
GENISTA. *G. ætnensis.
— *alba:* *Cytisus multiflorus.
— *Andreana:* *C. scoparius Andreanus.
— *canariensis:* *C. canariensis.
— *fragrans:* *C. fragrans.
—*hispanica (Cytisus).
— *juncea:* *Spartium junceum.
—*monosperma.
— *racemosa:* *C. racemosus.
— *scoparia:* *C. scoparius.
— tibetica (page 3568).
—*tinctoria.
GENTIANA. G. acaulis.
— Andrewsii.
— asclepiadea.
— crinita.
— Cruciata.
— lutea.
— scabra.
GERANIUM. *G. album:* applies probably to G. ibericum album, G. pratense album or G. maculatum album.
— armenum.
— *citriodorum:* Pelargonium acerifolium.
— collinum.
— Fremontii.
— grandiflorum.
— ibericum.
— *Londesii:* G. collinum.
— maculatum.
— *platypetalum:* G. ibericum platypetalum.
— pratense.
— Robertianum.

GERANIUM, continued.
— sanguineum.
— *zonale:* Pelargonium zonale.
GERARDIA. G. hybrida.
GERBERA. G. Jamesonii.
GESNERIA. *G. macrantha:* G. cardinalis.
GEUM. G. atrosanguineum; probably a form of G. chiloense.
— bulgaricum: botanically unknown.
— chiloense.
— coccineum, but sometimes G. chiloense.
— Heldreichii; probably a form of G. montanum.
— japonicum.
— *miniatum:* G. chiloense miniatum.
GILIA. G. achilleæfolia.
— androsacea (Leptosiphon).
— capitata.
— coronopifolia (Ipomopsis).
— densiflora (Leptosiphon).
— dianthoides (Fenzlia).
— laciniata.
— liniflora.
— micrantha (Leptosiphon).
— *nivalis:* a white form of G. tricolor.
GILLENIA. G. stipulata (Porteranthus).
— trifoliata.
GINKGO (Salisburia). *G. biloba.
GLADIOLUS. G. brenchleyensis.
— Childsii.
— gandavensis.
— Kunderdii.
— nanceianus.
— primulinus.
— princeps.
The cultivated forms of Gladiolus are not clearly referable to botanical species.
GLAUCIUM. *G. luteum:* G. flavum.
GLECHOMA. *G. variegata:* Nepeta hederacea variegata.
GLEDITSIA (Gleditschia). *G. japonica.
—*sinensis.
—*triacanthos.
GLOBULARIA. G. trichosantha.
GLORIOSA. G. Rothschildiana.
— superba.
GLOXINIA (the florists' Gloxinia is Sinningia speciosa). *G. crassifolia:* a strain of Sinningia speciosa.
— *gigantea:* a form of S. speciosa.
GLYCINE. G. Soja (Soybean). (Under the American Code Glycine replaces Apios, and the soybean becomes Soja max, Piper.)
GLYCYRRHIZA. G. glabra.
GNAPHALIUM. *G. lanatum:* Helichrysum petiolatum.
— *Leontopodium:* Leontopodium alpinum.
GODETIA. G. amœna.
— grandiflora.
— *Lindleyi:* *Œnothera Lindleyi,* a form of G. amœna.
— rubicunda: a form of G. amœna.
— Schwaminii: a form of G. amœna.
— *Whitneyi:* G. grandiflora.

GOMPHRENA. *G. aurea:* G. globosa aurea.
— globosa.
GONIOPHLEBIUM. *G. subauriculatum:* Polypodium subauriculatum.
GOODYERA (much difference of opinion exists as to the merits of this name, but it is retained by some recent orchid students and is probably tenable). *G. Menziesii:* G. decipiens (rather than G. Menziesii as on page 1357).
— pubescens.
— repens.
GRAMMANTHES. *G. gentianoides:* G. dichotoma.
GREVILLEA. *G. robusta.
—*Thelemanniana.
GUNNERA. G. manicata.
— *scabra:* G. chilensis.
GYMNOCLADUS. *G. canadensis:* *G. dioica.
GYMNOGRAMMA. *G. sulphurea:* Ceropteris sulphurea.
GYMNOTHRIX. *G. japonica:* Pennisetum japonicum.
— *latifolia:* P. latifolium.
GYNERIUM. *G. argenteum:* Cortaderia argentea.
— *jubatum:* C. Quila.
GYPSOPHILA. G. acutifolia.
— cerastioides.
— elegans.
— muralis.
— paniculata.
—*repens.

HABENARIA. H. blephariglottis.
— bracteata.
— ciliaris.
— dilatata.
— Hookeriana.
— hyperborea.
— psycodes.
HABROTHAMNUS. *H. elegans:* Cestrum elegans.
— *fasciculatus:* C. fasciculatum.
HÆMANTHUS. *H. albiflora:* H. albiflos.
— coccineus.
— puniceus.
HAKEA. *H. elliptica.
—*laurina.
—*saligna.
—*suaveolens.
HALESIA. *H. caroliniana:* H. carolina.
*H. tetraptera.
—*diptera.
—**tetraptera:* H. carolina.
HAMAMELIS. *H. japonica.
—*mollis.
—*virginiana.
— *virginica:* *H. virginiana.
— *Zuccariniana:* *H. japonica Zuccariniana.
HARDENBERGIA. *H. Comptoniana.
— *hibernica:* *H. helix hibernica.
—*monophylla.
HEDERA. *H. algeriensis:* *H. canariensis.
—*helix.
— *maculata:* *H. helix maculata.

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HEDERA, continued.
— *maderensis:* ***H. canariensis.**
— *Rægneriana:* ***H. colchica.**
— *variegata:* ***H. canariensis variegata.**
HEDYSARUM. *H. coronarium.
—***multijugum.**
HELENIUM. H. autumnale.
— **Bigelovii.**
— **Hoopesii.**
— *pumilum:* probably **H. autumnale pumilum.**
— **tenuifolium.**
HELIANTHELLA. H. quinquenervis.
HELIANTHEMUM. *H. alpestre.
— *croceum:* ***H. glaucum croceum.**
— *multiflorum:* probably **H. halimifolium multiflorum.**
— *mutabile:* ***H. Chamæcistus mutabile.**
— *polifolium:* ***H. Chamæcistus tomentosum.**
— *vulgare:* ***H. Chamæcistus.**
HELIANTHUS. H. annuus.
— **argyrophyllus.**
— *californicus:* probably **H. californicus,** but perhaps means **H. annuus californicus** in some lists.
— *cucumerifolius:* **H. debilis.**
— **decapetalus.**
— **giganteus.**
— *globosus:* **H. annuus globosus.**
— *macrophyllus:* **H. strumosus macrophyllus.**
— *Maximilianus:* **H. Maximilianii.**
— **mollis.**
— *multiflorus:* **H. decapetalus multiflorus.**
— *nanus:* **H. annuus nanus.**
— *orgyralis:* **H. orgyalis.**
— *rigidus:* **H. scaberrimus.**
— *sparsifolius:* **H. atrorubens.**
— **tuberosus.**
HELICHRYSUM. H. angustifolium (page 3568).
— **bracteatum.**
— *monstrosum:* double forms of **H. bracteatum.**
— **petiolatum** (Gnaphalium).
HELICODICEROS. H. muscivorus (Arum).
HELICONIA. *H. aurea:* **H. aureostriata.**
HELIOPSIS. *H. lævis:* **H. helianthoides.**
— *Pitcheriana:* **H. helianthoides Pitcheriana.**
— **scabra.**
HELIOTROPIUM. H. peruvianum.
HELIPTERUM. *H. album:* **H. roseum album** (Acroclinium).
— **corymbiflorum.**
— **Manglesii** (Rhodanthe).
— **roseum** (Acroclinium).
— *Sanfordii:* **H. Humboldtianum.**
HELLEBORUS. H. niger.
HELONIAS. H. bullata.
HEMEROCALLIS. H. aurantiaca.
— **citrina.**
— *disticha:* **H. fulva.**
— **Dumortieri.**
— **flava.**
HEMEROCALLIS, continued.
— **fulva.**
— *Kwanso:* **H. fulva Kwanso.**
— **luteola.**
— **Middendorffii.**
— **minor.**
— *Sieboldii:* **H. Dumortieri.**
— **Thunbergii.**
HEPATICA. H. acutiloba (Anemone).
— **angulosa.**
— **triloba** (Anemone).
HERACLEUM. *H. giganteum:* **H. villosum.**
HERNIARIA. H. glabra.
HESPERIS. H. matronalis.
HESPEROYUCCA. *H. Whipplei (Yucca).
HETEROCENTRON. *H. mexicanum:* ***H. roseum.**
HETEROMELES. *H. arbutifolia:* ***Photinia arbutifolia.**
HEUCHERA. H. americana.
— **brizoides.**
— *gracillima:* **H. sanguinea gracillima.**
— *rubrifolia:* **H. pubescens.**
— **sanguinea.**
HEVEA. H. brasiliensis.
HIBBERTIA. *H. volubilis.
HIBISCUS. *H. africanus:* **H. Trionum.**
— **coccineus.**
— *cruentus:* form of **H. Rosa-sinensis** probably (page 3568).
— **elatus** (Paritium).
— **esculentus** (Okra).
— **grandiflorus.**
— *Lambertianus:* form of **H. Rosa-sinensis** probably (page 3569).
— **Manihot.**
— **militaris.**
— *miniatus:* a form of **H. Rosa-sinensis.**
— **Moscheutos.**
— **mutabilis.**
— **oculiroseus.**
— **Rosa-sinensis.**
— **Sabdariffa** (Roselle).
— **schizopetalus.**
— *sinensis:* **H. Rosa-sinensis.**
— *subviolaceus:* a form of **H. Rosa-sinensis.**
—***syriacus** (Althæa).
— **tiliaceus** (Paritium).
HICORIA (see Carya). ***H. alba** (Mockernut): **Carya alba.**
—***cordiformis:** **C. cordiformis.**
—***glabra** (Pignut): **C. glabra.**
—***laciniosa** (Shellbark Hickory): **C. laciniosa.**
— *minima:* **C. cordiformis: *H.** cordiformis.
—***ovata** (Shagbark Hickory): **C. ovata.**
—***Pecan: C. Pecan.**
— *porcina* (Pignut): **C. glabra: *H.** glabra.
— *sulcata* (Shellbark Hickory): **C. laciniosa: *H.** laciniosa.
— *tomentosa* (Mockernut): **C. alba: *H.** alba.
HIERACIUM. H. aurantiacum.
— **villosum.**
HIPPEASTRUM. H. equestre (Amaryllis).
— **Johnsonii** (Amaryllis).
— **solandriflorum** (Amaryllis).
— **vittatum** (Amaryllis).
HIPPOPHAË. *H. rhamnoides.
HOLODISCUS. *H. arizefolius:* ***H. discolor arizefolius.**
HORDEUM. H. jubatum.
HOSTA (Funkia). **H. cærulea.**
— **Fortunei.**
— **lancifolia.**
— **plantaginea.**
— **Sieboldiana.**
HOUSTONIA. H. cærulea.
— **purpurea.**
— **serpyllifolia.**
HOVENIA. *H. dulcis.
HOWEA. H. Belmoreana (Kentia).
— **Forsteriana** (Kentia).
HOYA. H. carnosa.
HUMEA. H. elegans.
HUMULUS. *H. japonicus.
—***Lupulus** (Hop).
— *neo-mexicanus:* ***H. Lupulus neo-mexicanus.**
HUNNEMANNIA. H. fumariæfolia.
HYACINTHUS. *H. candicans:* **Galtonia candicans.**
— **orientalis.**
HYDRANGEA. *H. arborescens.
—***Bretschneideri.**
—***cinerea.**
— *grandiflora:* name in trade distinguishes either ***H. paniculata grandiflora** or ***H. arborescens grandiflora,** usually the former.
—***hortensis:** plant in trade is probably **H. opuloides Hortensia,** possibly sometimes **H. paniculata grandiflora.**
—***monstrosa: H. opuloides otaksa monstrosa.**
— *nivea:* ***H. radiata.**
—***opuloides.**
— *otaksa:* ***H. opuloides otaksa.**
—***paniculata.**
—***petiolaris** (see Schizophragma)
—***quercifolia.**
—***radiata.**
— *ramis pictis:* ***H. opuloides cyanoclada.**
—***rosea: H. opuloides otaksa rosea.**
— *scandens:* ***H. petiolaris.**
HYDRASTIS. H. canadensis.
HYDRIASTELE. *H. Wendlandiana.*
HYDROCLEIS. H. nymphoides (Limnocharis).
HYMENOCALLIS. H. calathina (Ismene. Pancratium).
HYMENOSPORUM. *H. flavum.
HYOPHORBE. H. amaricaulis.
— **Verschaffeltii** (Areca).
HYPERICUM. *H. adpressum.
—***Arnoldianum.**
—***aureum.**
—***Buckleii.**
—***calycinum.**
—***densiflorum.**
—***elegans.**
—***galioides.**

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HYPERICUM, continued.
—*hircinum.
—*Kalmianum.
—*lobocarpum.
—*Moserianum.
—*patulum.
—*prolificum.

HYPOCHŒRIS. H. uniflora.

HYPOXIS. *H. erecta:* H. hirsuta.

HYSSOPUS. H. officinalis.

IBERIS. *I. affinis:* I. pectinata.
— amara.
— *corifolia:* I. saxatilis corifolia.
— *coronaria:* I. amara coronaria, not I. coronaria of botanists.
— gibraltarica.
— *jucunda:* Æthionema coridifolium.
— odorata.
— pectinata.
— saxatilis.
— sempervirens.
— Tenoreana.
— umbellata.

ILEX. *I. Aquifolium.
—*Cassine.
—*corallina.
—*crenata.
— *Dahoon:* *I. Cassine.
—*decidua.
—*glabra.
—*monticola.
—*opaca.
— *pyramidalis:* *I. Aquifolium pyramidalis.
—*serrata.
—*verticillata.
—*vomitoria.

ILLICIUM. *I. anisatum.

IMPATIENS. I. Balsamina (Garden Balsam).
— *glanduligera:* I. Roylei.
— Holstii.
— platypetala.
— Roylei.
— Sultani.

INCARVILLEA. I. Delavayi.
— grandiflora.
— variabilis.

INDIGOFERA. *I. floribunda:* *I. Gerardiana.
—*tinctoria.

INULA. I. britannica.
— ensifolia.
— glandulosa.
— grandiflora.
— montana (page 3569).
— Oculus-Christi.
— Royleana.

IOCHROMA. *I. fuchsioides.
—*lanceolatum.

IONOPSIDIUM. I. acaule.

IPOMŒA. I. Batatas (Sweet Potato).
— *Bona-nox:* Calonyction aculeatum; sometimes apparently applied to a strain of I. Tuba.
— *coccinea:* Quamoclit coccinea.
— *grandiflora:* probably I. Tuba, but perhaps sometimes applied to I. hederacea grandiflora or Calonyction aculeatum.
— hederacea.

IPOMŒA, continued.
— Learii, but the trade plant may be erroneously I. mutabilis.
— *limbata:* I. hederacea limbata.
— *mexicana:* I. hirsutula.
— *Nil:* I. hederacea.
— *noctiflora:* Calonyction aculeatum.
— pandurata.
— *paniculata:* I. digitata.
— purpurea (Convolvulus).
— *Quamoclit:* Quamoclit pinnata.
— *rubro-cærulea:* I. tricolor.
— setosa.
— Tuba.

IPOMOPSIS. *I. elegans:* Gilia coronopifolia.

IRESINE (see Achyranthes). I. Herbstii.
— Lindenii.

IRIS. *I. asiatica:* I. pallida.
— *atropurpurea:* probably I. atropurpurea; perhaps also applied to a color form of I. pumila or I. germanica.
— aurea.
— Cengialti.
— cristata.
— *cuprea:* I. fulva.
— *cyanea:* I. reticulata cyanea.
— *dalmatica:* I. pallida dalmatica.
— flavescens.
— florentina.
— fœtidissima.
— germanica.
— gracilipes (page 3569).
— graminea,
— *Kaempferi:* I. lævigata.
— lævigata.
— longipetala.
— macrantha.
— missouriensis.
— *ochroleuca:* I. orientalis.
— orientalis.
— pallida.
— plicata.
— Pseudacorus.
— pumila.
— reticulata.
— sibirica.
— *spectabilis:* I. Xiphium.
— *styłosa:* I. unguicularis.
— verna.
— versicolor.
— *virginica:* I. versicolor.
— Wilsonii.
— xiphioides.
— Xiphium.

ISMENE. *I. calathina:* Hymenocallis calathina.

ISOLEPIS. *I. gracilis:* Scirpus cernuus.

ITEA.* I. virginica.

IXIA. *I. crateroides:* I. speciosa. The Ixia names are difficult to identify with the botanical species; apparently I. columellaris and I. maculata and others, enter into them.

IXORA. I. coccinea; sometimes misapplied to I. chinensis.
— *Colei:* I. coccinea.
— *Dixiana:* I. coccinea.
— *Fraseri:* I. coccinea.
— javanica.

JACARANDA. *J. mimosæfolia:* *J. ovalifolia.

JACOBÆA. *J. elegans:* Senecio elegans.

JACOBINIA. J. coccinea.
— *magnifica:* J. carnea.
— pauciflora (Libonia).

JAMESIA. *J. americana.

JASMINUM. *J. azoricum.
—*fruticans.
—*gracillimum.
—*grandiflorum.
—*humile.
— *ligustrifolium:* *J. rigidum.
—*nitidum.
—*nudiflorum.
—*officinale.
—*primulinum.
— *revolutum:* *J. humile.
—*rigidum.
—*Sambac.

JUBÆA. J. spectabilis.

JUGLANS. *J. ailanthifolia:* *J. Sieboldiana.
—*californica.
—*cinerea.
— *cordiformis:* *J. Sieboldiana cordiformis.
— *japonica:* the cultivated plant is probably either *J. Sieboldiana or *J. regia.
—*nigra.
— *præparturiens:* *J. regia fertilis.
—*regia.
—*Sieboldiana.
— *Sieboldii:* *J. Sieboldiana.

JUNCUS. J. effusus.

JUNIPERUS. *J. argentea:* *J. chinensis albo-variegata.
— *aurea:* the name is applied to both *J. communis aurea and *J. chinensis aurea.
— *bermudiana:* *J. barbadensis.
—*californica.
— *canadensis:* *J. communis depressa.
—*chinensis.
—*communis.
—*communis montana.
—*excelsa.
— *hibernica:* *J. communis hibernica.
—*horizontalis (see J. Sabina, below).
—*japonica:* J. chinensis japonica (page 3569).
—*macrocarpa.
—*monosperma.
— *nana:* *J. communis montana.
— *neoboriensis:* *J. macrocarpa.
— *oblonga:* *J. communis oblonga.
—*pachyphlœa.
— *Pfitzeriana:* *J. chinensis Pfitzeriana.
—*phœnicea.
— procumbens: the cultivated plant is perhaps J. chinensis Sargentii (page 3569).
— *prostrata:* J. horizontalis.
—*rigida.
—*Sabina (J. horizontalis is sometimes cultivated under this name).
—*scopulorum.
— *sibirica:* *J. communis montana.
— *sinensis:* *J. chinensis.
—*squamata.

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JUNIPERUS, continued.
— *stricta:* *J. excelsa stricta.
— *suecica:* *J. communis suecica.
— *tamariscifolia:* *J. Sabina tamariscifolia.
—*virginiana.

JUSSIÆA. J. longifolia.

KADSURA. *K. japonica.

KALANCHOË. K. flammea.

KALMIA. *K. angustifolia.
— *glauca:* *K. polifolia.
—*latifolia.

KAULFUSSIA. *K. amelloides:* Charieis heterophylla.

KENNEDYA. *K. cærulea:* probably *Hardenbergia Comptoniana.
— *Comptoniana:* *H. Comptoniana.
— *ovata:* *H. monophylla.

KENTIA. *K. Belmoreana:* Howea Belmoreana.
— *Canterburyana:* Hedyscepe Canterburyana.
— *Forsteriana:* Howea Forsteriana.
— *Macarthuri:* Ptychosperma Macarthuri.
— Sanderiana.
— *Wendlandiana:* Hydriastele Wendlandiana.

KERRIA. *K. japonica (Corchorus).

KNIPHOFIA (see Tritoma). *K. alooides:* K. Uvaria.
— corallina.
— foliosa.
— Macowanii.
— *nobilis:* T. Uvaria nobilis.
— Pfitzeri.
— Saundersii.
— sulphurea.
— Uvaria (alooides).

KOCHIA. K. trichophylla.

KŒLREUTERIA. *K. paniculata.

LABURNUM. *L. alpinum (Cytisus).
—*vulgare:* L. anagyroides (Cytisus).
—*Watereri (Cytisus).

LACINIARIA. *L. pumila:* Liatris spicata montana.
— *pycnostachya:* Liatris pycnostachya.
— *spicata:* Liatris spicata.

LACHENALIA. L. luteola.
— Nelsonii.
— pendula.
— quadricolor.
— tricolor.

LACTUCA. L. sativa (Lettuce).

LAGENARIA. L. leucantha.
— *vulgaris:* L. leucantha.

LAGERSTRŒMIA. *L. indica.

LAGUNARIA. *L. Patersonii.

LAGURUS. L. ovatus.

LAMARCKIA. L. aurea (Chrysurus).

LAMIUM. *L. album:* L. maculatum.
— *purpureum:* probably L. maculatum rather than the true L. purpureum.

LANTANA. *L. delicatissima:* probably L. Sellowiana.
— *hybrida:* dwarf garden forms of L. Camara.
— Sellowiana.

LAPAGERIA. *L. alba.* L. rosea albiflora.
— rosea.

LAPEYROUSIA. L. cruenta (Anomatheca).

LARIX. *L. americana:* *L. laricina.
— decidua. *L. europæa.
—*europæa:* L. decidua.
— hybrida (page 3569).
— *Kaempferi:* *L. leptolepis.
—*laricina.
—*leptolepis.

LASIANDRA. *L. macrantha:* Tibouchina semidecandra.

LASTREA. *L. dilatata:* Dryopteris spinulosa dilatata.
— *Filix-mas:* D. Filix-mas.

LATANIA. *L. borbonica:* L. Commersonii; stock usually Livistona chinensis.

LATHYRUS. L. grandiflorus; also applies to L. latifolius grandiflorus.
— latifolius.
— magellanicus.
— niger (Orobus).
— odoratus.
— vernus (Orobus).

LAUROCERASUS. *L. Bertinii:* Prunus Laurocerasus Bertinii: *L. officinalis Bertinii.
—*caroliniana:* P. caroliniana.
— *caucasica:* P. Laurocerasus caucasica: *L. officinalis caucasica.
— *colchica:* P. Laurocerasus colchica: *L. officinalis colchica.
—*lusitanica:* P. lusitanica.
—*officinalis:* P. Laurocerasus.
— *rotundifolia:* P. Laurocerasus rotundifolia: *L. officinalis rotundifolia.
— *versaillensis:* P. Laurocerasus versaillensis: *L. officinalis versaillensis.

LAURUS. *L. Benzoin:* *Benzoin æstivale.
— *Cerasus:* Prunus Laurocerasus: *Laurocerasus officinalis.
— *lusitanica:* Prunus lusitanica: *Laurocerasus lusitanica.
—*nobilis.

LAVANDULA. **officinalis:* L. vera. *L. Spica.

LAVATERA. *L. alba:* L. trimestris alba.
— arborea.
— *rosea:* L. trimestris.
— *splendens:* L. trimestris splendens.
— trimestris.

LAYIA. L. elegans.

LEDUM. *L. grœnlandicum.
— *latifolium:* *L. grœnlandicum.
—*palustre.

LEIOPHYLLUM (Dendrium). *L. buxifolium.

LEONOTIS. L. Leonurus.

LEONTOPODIUM. L. alpinum (Gnaphalium).

LEPACHYS. L. columnaris (Obeliscaria).
— pinnata.

LEPARGYREA. See Shepherdia.

LEPIDIUM. L. sativum (Cress).

LEPTOSIPHON. *L. androsaceus:* Gilia androsacea.
— *aureus:* G. micrantha.
— *carmineus:* G. micrantha.
— *densiflorus:* G. densiflora.
— *hybridus:* G. micrantha.

LEPTOSPERMUM. L. flexuosum (Agonis).
—*lævigatum.

LEPTOSYNE. L. maritima.
— Stillmanii.

LESPEDEZA. *L. bicolor (Desmodium).
— japonica. *D. japonicum.
— *Sieboldii:* L. formosa, Koehne (L. Sieboldii is not tenable under the rules):*D. penduliflorum.

LEUCÆNA. *L. glauca.

LEUCOCRINUM. L. montanum.

LEUCOJUM. L. æstivum.
— vernum.

LEUCOTHOË. *L. Catesbæi (Andromeda).
—*racemosa.
—*recurva.

LEYCESTERIA. *L. elegans:* *L. formosa.

LIATRIS (Laciniaria). L. elegans.
— ligulistylis.
— punctata.
— pycnostachya.
— scariosa.
— spicata.

LIBOCEDRUS. *L. chilensis.
—*decurrens.

LIBONIA. *L. floribunda:* Jacobinia pauciflora.

LICUALA. L. grandis.

LIGULARIA. L. clivorum (Senecio).
— Kaempferi (Farfugium. Senecio).
— Wilsoniana (see Senecio, page 3153).

LIGUSTRUM. *L. acuminatum.
—*amurense; but misapplied to L. sinense.
— *chinense:* *L. sinense.
—*coriaceum.
—*Ibota.
—*japonicum.
—*lucidum.
— *macrocarpum:* *L. acuminatum macrocarpum.
— *macrophyllum:* *L. lucidum.
— *marginatum:* probably L. vulgare argenteo-marginatum or aureo-marginatum.
— *medium:* *L. acuminatum.
—*nepalense.
—*ovalifolium.
—*Quihoui.
— *Regelianum:* *L. Ibota Regelianum.
—*sinense.
— *spicatum:* the cultivated plant is probably L. Massalongianum, L. japonicum, L. lucidum or L. nepalense.
—*vulgare.

LILIUM. L. auratum.
— Batemanniæ.
— *Bloomerianum:* L. Humboldtii.
— Bolanderi.

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LILIUM, continued.
— **Brownii.**
— **canadense.**
— **candidum.**
— **carolinianum.**
— **chalcedonicum.**
— *colchicum:* **L. monadelphum.**
— **columbianum.**
— **concolor.**
— **croceum.**
— **dauricum.**
— **elegans.**
— *excelsum:* **L. testaceum.**
— **giganteum**; applies also to **L. longiflorum giganteum.**
— **Grayi.**
— **Hansonii.**
— **Henryi.**
— **Humboldtii.**
— **japonicum.**
— **Kelloggii.**
— *Krameri:* **L. japonicum.**
— **Leichtlinii.**
— **longiflorum.**
— *maculatum:* **L. medioloides, L. candidum maculatum** or **L. chalcedonicum maculatum.**
— *magnificum:* **L. speciosum magnificum** or **L. Humboldtii magnificum.**
— **maritimum.**
— **Martagon.**
— **Maximowiczii.**
— *myriophyllum:* **L. regale.**
— *pardalinum.*
— **Parryi.**
— **parviflorum.**
— **parvum.**
— **philadelphicum.**
— *puberulum:* **L. Humboldtii puberulum.**
— **rubellum.**
— *rubescens:* **L. washingtonianum rubescens.**
— **Sargentiæ.**
— **speciosum**; perhaps sometimes misapplied to **L. candidum speciosum.**
— **superbum.**
— *Szovitzianum:* **L. mouadelphum Szovitzianum.**
— **tenuifolium.**
— **testaceum.**
— *Thomsonianum:* **L. roseum.**
— *Thunbergianum:* **L. elegans.**
— **tigrinum.**
— *umbellatum:* probably **L. dauricum**, but may be true **L. umbellatum.**
— **Wallichianum.**
— **washingtonianum.**

LIMNANTHEMUM. *L. indicum:* **Nymphoides indicum.**
— *lacunosum:* **N. lacunosum.**
— *nymphæoides:* **N. peltatum.**

LIMNANTHES. **L. Douglasii.**

LIMNOCHARIS. *L. Humboldtii:* **Hydrocleis nymphoides.**

LIMODORUM. *L. pulchellus:* **Calopogon pulchellus.**

LIMONIUM. See the names under Statice.

LINARIA. *L. alba:* perhaps **L. Cymbalaria alba** or **L. bipartita aiba.**
— **bipartita.**
— **Cymbalaria.**

LINARIA, continued.
— **hepaticæfolia.**
— **macedonica.**
— **maroccana.**
— **reticulata.**

LINDELOFIA. **L. longifolia.**

LINDERA. *L. Benzoin:* ***Benzoin æstivale.**

LINOSYRIS. **L. vulgaris.**

LINUM. **L. austriacum.**
— *coccineum:* **L. grandiflorum coccineum.**
— **flavum.**
— **grandiflorum.**
— **Lewisii.**
— **narbonnense.**
— **perenne.**

LIPARIS. **L. liliifolia.**
— **Lœselii.**

LIPPIA. **L. citriodora** (Aloysia. Verbena).
— *repens:* **L. canescens.**

LIQUIDAMBAR. ***L. Styraciflua.**

LIRIODENDRON. ***L. Tulipifera.**

LISIANTHUS. *L. Russellianus:* probably **Eustoma Russellianum**, although true **L. Russellianus** is sometimes cultivated.

LITCHI. **L. chinensis** (Nephelium).

LITHOCARPUS. See page 3569.

LIVISTONA. **L. australis** (Corypha).
— **chinensis** (Latania).
— **rotundifolia.**

LOASA. *L. aurantiaca:* **Blumenbachia lateritia.**
— **tricolor.**

LOBELIA. **L. cardinalis**; stock is sometimes **L. fulgens.**
— **Erinus.**
— *gracilis:* applies to **L. gracilis** or **L. Erinus gracilis.**
— **heterophylla**; or the stock may be **L. Erinus.**
— *pumila:* **L. Erinus pumila**, not **L. pumila** of botanists.
— *ramosa:* **L. tenuior.**
— *speciosa:* **L. Erinus speciosa**, not **L. speciosa** of botanists.
— **syphilitica.**
— **tenuior.**
— **Tupa.**

LOMARIA. *L. ciliata:* **Blechnum Moorei.**

LONICERA. *L. Albertii:* ***L. spinosa Alberti** (Chamæcerasus).
— *albida:* ***L. bella albida.**
— *aurea.* ***L. Periclymenum aurea**, not **L. aurea** of botanists.
— *belgica:* ***L. Periclymenum belgica.**
—***bella.**
— *brachypoda:* a form of **L. japonica.**
—***Brownii.**
—***canadensis.**
—***Caprifolium**; but the plant cultivated is perhaps sometimes **L. americana.**
— *chinensis:* ***L. japonica chinensis.**
—***chrysantha.**
—***dioica.**
—***flava.**
— *flexuosa:* ***L. japonica flexuosa.**

LONICERA, continued.
—***fragrantissima**; sometimes also used for **L. Standishii.**
— *fuchsioides:* ***L. Brownii fuchsioides**, not **L. fuchsioides** of botanists.
— *gigantea:* either **L. etrusca pubescens** or **L. etrusca superba.**
— *glauca:* ***L. dioica.**
— **grandiflora:** ***L. tatarica grandiflora.**
— *Halliana:* ***L. japonica Halliana.**
—***Heckrottii.**
—***Henryi.**
—***involucrata.**
—***japonica.**
—***Ledebouri.**
—***Maackii** (Chamæcerasus).
—***Morrowii.**
—***muendeniensis.**
—***muscaviensis.**
—***nothá.**
—***oblongifolia.**
—***Periclymenum.**
—***pileata.**
—***pyrenaica.**
—***Ruprechtiana.**
—***segreziensis.**
—***sempervirens.**
— *sinensis:* ***L. Standishii.**
—***spinosa** (Chamæcerasus). Name sometimes applied to ***L. spinosa Alberti.**
—***Standishii.**
— *Sullivantii:* ***L. prolifera.**
—***tatarica.**
—***thibetica.**
—***trichosantha.**
— *virginalis:* ***L. tatarica virginalis.**
—***Xylosteum.**

LOPHOSPERMUM. *L. scandens:* **Maurandia Lophospermum.**

LOTUS. **L. Bertholetii.**
— **corniculatus.**
— **Jacobæus.**
— *peliorhynchus:* **L. Bertholetii.**

LUCUMA. **L. mammosa.**
— **nervosa.**

LUFFA. **L. acutangula** (Cucumis).
— **cylindrica.**

LUNARIA. *L. biennis:* **L. annua.**

LUPINUS. **L. affinis.**
— **arboreus.**
— *Cruikshanksii:* **L. mutabilis Cruikshanksii.**
— **Hartwegii.**
— **hirsutus.**
— **luteus**; but also **L. arboreus luteus.**
— **mutabilis.**
— **nanus.**
— **perennis.**
— **polyphyllus.**
— **subcarnosus.**
— *tricolor:* **L. Dunnettii.**

LYCHNIS. **L. alpina.**
— **chalcedonica.**
— **Cœli-rosa** (Agrostemma. Viscaria).
— **Coronaria.**
— **diurna: L. dioica.**
— **Flos-cuculi.**
— **Flos-Jovis** (Agrostemma).
— *fulgens:* probably a form of **L. coronata** rather than the true **L. fulgens.**

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LYCHNIS, continued.
— *grandiflora:* **L. coronata.**
— **Haageana.**
— *plenissima:* **L. Flos-cuculi plenissima.**
— *Sieboldii:* **L. coronata Sieboldii.**
— *splendens:* **L. Viscaria splendens.**
— *vespertina:* **L. alba.**
— **Viscaria** (Viscaria).

LYCIUM. ***L. barbarum**; the plants cultivated as L. barbarum and L. europæum are usually L. halimifolium or L. chinense; the true species (L barbarum and L. europæum) are probably not grown in this country.
—***chinense.**
—***europæum.**
—***halimifolium.**

LYCOPERSICUM. **L. esculentum** (Tomato).
— **pimpinellifolium.**

LYCOPODIUM. **L. clavatum.**
— **complanatum.**
— *dendroideum:* **L. obscurum.**
— **lucidulum.**

LYCORIS. **L. squamigera** (Amaryllis Hallii).

LYGODIUM. **L. japonicum.**
— **palmatum.**
— **scandens.**

LYONIA. ***L. ligustrina:** Xolisma ligustrina.

LYONOTHAMNUS. ***L. floribundus.**

LYSIMACHIA. **L. barystachys.**
— *ciliata:* **Steironema ciliatum.**
— **clethroides.**
— **Fortunei.**
— **japonica** (page 3569).
— **Nummularia.**
— **punctata.**
— **thyrsiflora.**
— **vulgaris.**

LYTHRUM. **L. alatum.**
— *roseum:* **L. Salicaria roseum.**
— **Salicaria.**
— **virgatum.**

MAACKIA. ***M. amurensis** (Cladrastis).

MACADAMIA. **M. ternifolia.**

MACLURA. *M. aurantiaca:* ***M. pomifera:** Toxylon pomiferum.

MAGNOLIA. ***M. acuminata.**
— *alba superba:* ***M. Soulangeana alba superba.**
— *Alexandrina:* ***M. Soulangeana Alexandrina.**
—**atropurpurea:* probably a form of **M. liliflora.**
—**conspicua:* **M. denudata.**
— **cordata:** ***M. acuminata cordata.**
— **denudata.**
—***Fraseri.**
— *fuscata:* ***Michelia fuscata.**
—***glauca.**
— *gloriosa:* ***M. grandiflora gloriosa.**
—***grandiflora.**
— *Halleana:* ***M. stellata.**
—***hypoleuca.**
—***Kobus.**
— *Lennei:* ***M. Soulangeana Lennei.**
— **liliflora:** ***M. obovata.**
—***macrophylla.**
— *Norbertiana:* ***M. Soulangeana Norbertiana.**
—**obovata:* **M. liliflora.**
—***parviflora.**
— *purpurea:* **M. liliflora:** ***M. obovata.**
— *rustica:* ***M. Soulangeana rustica.**
—***salicifolia**; sometimes misapplied to M. grandiflora angustifolia.
—***Soulangeana.**
— *speciosa:* ***M. Soulangeana speciosa.**
—***stellata.**
— *stricta:* ***M. grandiflora exoniensis.**
—***Thompsoniana.**
—***tripetala.**
—***Watsonii.**
— *Yulan:* **M. denudata:** ***M. conspicua.**

MAHONIA (Odostemon under American Code). ***M. Aquifolium.**
—***Fortunei.**
—***japonica.**
—***nervosa.**
—***pinnata.**
—***repens.**

MAIANTHEMUM (Unifolium under American Code). **M. bifolium** (Smilacina).

MALCOMIA. **M. maritima.**

MALOPE. *M. grandiflora:* **M. trifida grandiflora.**
— *rosea:* **M. trifida rosea.**

MALUS. ***M. angustifolia:** Pyrus angustifolia.
—***Arnoldiana:** Pyrus pulcherrima Arnoldiana.
—***atrosanguinea:** P. atrosanguinea.
—***baccata:** P. baccata.
— *cerasiformis:* **P. cerasifera:** ***Malus cerasifera.**
—***coronaria:** P. coronaria.
— *crataegifolia:* **P. florentina:** ***Malus florentina.**
—***Dawsoniana:** supposed hybrid of P. fusca and P. Malus (see page 2876).
— *denticulata:* unidentified; probably **P. prunifolia Rinki.**
—***florentina:** P. florentina.
—***floribunda:** P. pulcherrima.
—***fusca:** P. fusca.
—***Halliana:** P. Halliana.
—***ioensis:** P. ioensis.
— *Malus:* **P. Malus:** ***M. sylvestris.**
—***Niedzwetzkyana:** P. Malus Niedzwetzkyana.
—***Parkmanii:** P. Halliana Parkmanii.
—***prunifolia:** P. prunifolia.
— *Ringo:* **P. prunifolia Rinki:** ***Malus prunifolia Rinki.**
—***Sargentii:** P. Sargentii.
—***Scheideckeri:** P. pulcherrima Scheideckeri.
— *Sieboldii:* **P. Sieboldii:** ***M. Toringo.**
—***Soulardii:** P. Soulardii.
—***spectabilis:** P. spectabilis.
—***sylvestris:** P. Malus.
—***Toringo:** P. Sieboldii.
—***Zumi:** P. Zumi.

MALVA. **M. Alcea.**
— **crispa.**
— *miniata:* **Sphæralcea cisplatina.**
— **moschata.**

MALVAVISCUS. **M. arboreus** (Achania).

MAMMEA. **M. americana.**

MANDEVILLA. ***M. suaveolens.**

MANETTIA. **M. bicolor:** some of the stock is probably **M. inflata.**

MANGIFERA. **M. indica.**

MANIHOT. **M. utilissima** (Cassava).

MARANTA. **M. Closonii.**
— **Goveniana:** unknown botanically.
— *illustris:* **Calathea illustris.**
— *insignis:* **C. insignis.**
— *Kerchoveana:* **M. leuconeura Kerchoveana.**
— *Makoyana:* **C. Makoyana.**
— *Massangeana:* **M. leuconeura Massangeana.**
— *rosea:* probably **C. roseo-picta.**
— *Sanderi:* probably **C. Sanderiana.**
— *Vandenheckei:* **C. Vandenheckei.**
— *vittata:* **C. vittata.**

MARRUBIUM. **M. vulgare** (Horehound).

MARSHALLIA. **M. trinervia.**

MARTINEZIA. **M. caryotæfolia.**

MARTYNIA. *M. Craniolaria:* **Craniolaria annua.**
— *formosa:* **M. fragrans.**
— **lutea.**
— *proboscidea:* **M. louisiana.**

MATRICARIA. *M. capensis:* **M. Chamomilla parthenoides.**
— *grandiflora:* **M. inodora plenissima,** not M. grandiflora of botanists.
— **parthenoides.**

MATTEUCCIA. **M. Struthiopteris** (Onoclea).

MATTHIOLA. **M. bicornis.**
— **incana.**

MAURANDIA. *M. antirrhiniflora:* **Antirrhinum maurandioides.**
— **Barclaiana.**
— *Emeryana:* a color form of **M. Barclaiana.**
— **Lophospermum** (Lophospermum).

MAYTENUS. ***M. Boaria.**

MECONOPSIS. **M. integrifolia.**

MEDICAGO. **M. arborea.**
— **sativa** (Alfalfa).
— **scutellata.**

MEDINILLA. *M. amabilis:* **M. Teysmannii.**
— **magnifica.**

MELALEUCA. *M. alba:* ***M. armillaris.**
—***decussata.**
—***ericifolia.**
—***hypericifolia.**
—***incana.**
—***Leucadendron.**
—***nesophila.**
— *oppositifolia:* ***M. hypericifolia.**
—***Wilsonii.**

MELIA. ***M. Azedarach.**
— *umbraculifera:* ***M. Azedarach umbraculiformis.**

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MELIANTHUS. M. major.
MELICOCCA. M. bijuga (Genip).
MELILOTUS. M. alba.
MELISSA. M. officinalis (Balm).
MELOTHRIA. M. punctata (Pilogyne).
— scabra.
MENISPERMUM. *M. canadense.
— dauricum.
MENTHA. M. piperita.
— rotundifolia.
— *viridis:* M. spicata.
MENTZELIA. M. aurea, Baill. (M. Lindleyi not tenable under the rules). (Bartonia).
MENYANTHES. M. trifoliata.
MENZIESIA. *M. pilosa.
MERATIA. *M. præcox (Chimonanthus).
MERTENSIA. M. ciliata.
— virginica.
MESEMBRYANTHEMUM. M. cordifolium.
— crystallinum.
— roseum.
— *tricolor:* M. pyropeum.
MESPILUS. *M. germanica.
METROSIDEROS. *M. floribunda:* *Callistemon lanceolatus.
—*robusta.
— *semperflorens:* *Callistemon lanceolatus.
MICHELIA. *M. fuscata.
MILLA. M. biflora.
MILLETTIA. *M. megasperma (see Vol. V, page 2706).
MIMOSA. M. pudica.
MIMULUS. M. cardinalis.
— cupreus.
— moschatus.
— ringens.
— *Roezlii:* M. luteus aipinus.
— *tigrinus:* a form of M. luteus.
MINA. *M. lobata:* Quamoclit lobata.
— *sanguinea:* Q. coccinea hederifolia.
MIRABILIS. M. Jalapa.
— longiflora.
MISCANTHUS (Eulalia). M. sinensis.
MITCHELLA. M. repens.
MITELLA. M. diphylla.
MOLINIA. M. cærulea (Aira).
MOLUCCELLA. M. lævis.
MOMORDICA. M. Balsamina.
— Charantia.
— *Elaterium:* Ecballium Elaterium.
MONARDA. M. didyma.
— fistulosa.
— *mollis:* M. fistulosa mollis.
MONSTERA. M. deliciosa.
MONTBRETIA. *M. aurantiaca:* Tritonia crocosmæflora aurantiaca.
— *crocosmæflora:* T. crocosmæflora.
— *Pottsii:* T. Pottsii.
— *rosea:* T. rosea.
— *speciosa:* T. crocosmæflora speciosa.
MORUS. *M. alba.
—*multicaulis.
—*nigra.
— *pendula:* *M. alba pendula.
—*rubra.
— *tatarica:* *M. alba tatarica.
MUCUNA. *M. pruriens:* Stizolobium pruriens.
MUEHLENBECKIA. *M. complexa.
— platyclada.
MUSA. M. Cavendishii.
— Ensete.
— *sapientum:* M. paradisiaca sapientum.
MUSCARI. M. botryoides.
MYOPORUM. *M. lætum.
MYOSOTIS. M. alpestris.
— azorica.
— dissitiflora.
— *elegantissima:* probably M. dissitiflora elegantissima, but has also been applied to forms of M. palustris and M. sylvatica.
— *palustris:* M. scorpioides.
— *stricta:* M. alpestris stricta, not M. stricta of botanists.
— sylvatica.
MYRICA. *M. asplenifolia:* *Comptonia asplenifolia.
— carolinensis (*Northern Bayberry).
— cerifera (*Southern Wax Myrtle). What was formerly considered to be one species and listed as M. cerifera is now known to be two species. Both species range as far south as Florida, but the true M. cerifera extends north only to Maryland and southern New Jersey, whereas M. carolinensis grows wild to Nova Scotia.
—*Gale.
MYRICARIA. M. germanica (Tamarix).
MYRIOPHYLLUM. M. proserpinacoides.
MYRISTICA. M. fragrans (Nutmeg).
MYRSIPHYLLUM. *M. asparagoides:* Asparagus asparagoides.
MYRTUS. *M. communis.
— *Luma:* *Eugenia apiculata.
— *microphylla:* *M. communis microphylla, not M. microphylla of botanists.
—*Ugni.

NANDINA. *N. domestica.
NARCISSUS. The garden forms of Narcissus are not usually sold under the names of the botanical species. The main species-types represented in the common cultures are given here.
— biflorus.
— Bulbocodium.
— incomparabilis.
— Jonquilla.
— *orientalis:* N. Tazetta orientalis.
— *ornatus:* N. poeticus ornatus.
— poetaz (hybrid).
NARCISSUS, continued.
— poeticus.
— Pseudo-Narcissus.
— Tazetta.
NASTURTIUM. *N. officinale:* Roripa Nasturtium (also entered as Radicula Nasturtium-aquaticum).
NEGUNDO. *N. aceroides:* *Acer Negundo.
— *fraxinifolium:* *A. Negundo.
NELUMBIUM. *N. album:* Nelumbo nucifera alba.
— *kermesinum:* Nelumbo nucifera kermesina.
— *luteum:* Nelumbo lutea.
— *pekinensis:* Nelumbo nucifera pekinensis.
— *roseum:* Nelumbo nucifera rosea.
NELUMBO. The proper form of the name; see above.
NEMESIA. *N. compacta:* N. versicolor compacta.
— strumosa.
NEMOPANTHUS. *N. canadensis:* *N. mucronata.
NEMOPHILA. *N. atomaria:* N. Menziesii.
— *crambeoides:* N. Menziesii crambeoides.
— *discoidalis:* N. Menziesii discoidalis.
— *insignis:* N. Menziesii insignis.
— maculata.
NEPENTHES. N. atrosanguinea.
— Courtii.
— *Dominiana:* probably N. Dominii.
— Henryana.
— intermedia.
— Mastersiana.
— *Patersonii:* N. Paradisæ.
— Phyllamphora.
— Sedenii.
NEPETA. N. Cataria (Catnip).
— *Glechoma:* N. hederacea (Glechoma).
— Mussinii.
— Wilsonii.
NEPHELIUM. *N. Litchi:* Litchi chinensis.
NEPHRODIUM. *N. hirtipes:* Dryopteris hirtipes.
NEPHROLEPIS. *N. cordata:* N. cordifolia.
— exaltata.
The Nephrolepis names are now many, representing mutations from N. exaltata. See Nephrolepis, page 2131; also page 3569.
NERINE. N. sarniensis.
NERIUM. N. album: probably a variety of N. Oleander.
— atropurpureum: probably a variety of N. Oleander.
—*Oleander.
NEVIUSIA. *N. alabamensis.
NICANDRA. N. Physalodes.
NICOTIANA. *N. affinis:* N. alata grandiflora.
— alata.
— *atropurpurea:* a horticultural form of N. Tabacum macrophylla.

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NICOTIANA, continued.
— *colossea:* **N. tomentosa.**
— **Sanderæ.**
— **sylvestris.**
— **Tabacum** (Tobacco).
— **tomentosa.**

NIEREMBERGIA. N. frutescens.
— **gracilis.**
— **rivularis.**

NIGELLA. N. damascena.

NIPHOBOLUS. *N. lingua:* **Cyclophorus Lingua.**

NOLANA. *N. atriplicifolia:* **N. paradoxa.**
— *grandiflora:* **N. paradoxa.**

NOLINA. N. Beldingii.
— **longifolia.**
— **Parryi** (Dasylirion).

NUPHAR. N. advena.

NYCTERINIA. *N. capensis:* **Zaluzianskya capensis.**
— *selaginoides:* **Z. selaginoides.**

NYMPHÆA (Castalia). **N. alba;** sometimes applied to a white form of **N. gigantea.**
— **Bissetii.**
— **cærulea;** but may sometimes be **N. capensis.**
— *candidissima:* **N. alba candidissima.**
— **capensis.**
— **Daubeniana.**
— **Deaniana.**
— *dentata:* **N. Lotus dentata.**
— **devoniensis.**
— *flava:* **N. mexicana.**
— **flavo-virens.**
— **gigantea.**
— **Gladstoniana.**
— *gracilis:* probably **N. flavo-virens,** possibly form of N. gigantea.
— **kewensis.**
— **Laydeckeri.**
— *Marliacea:* a race of hybrids.
— **mexicana.**
— **odorata.**
— **ovalifolia** (page 3570).
— **pulcherrima.**
— *pygmæa:* **N. tetragona.**
— *Richardsonii:* **N. tuberosa Richardsonii.**
— **Robinsonii.**
— **rubra-rosea.**
— **Sturtevantii.**
— **tetragona.**
— **tuberosa.**
— *zanzibariensis:* **N. capensis zanzibariensis.**

NYMPHOIDES. N. indicum (Limnanthemum).

NYSSA. *N. aquatica.
— *multiflora:* ***N. sylvatica.**
—***sylvatica.**

OAKESIA. O. sessilifolia (Uvularia).

OBELISCARIA. *O. pulcherrima:* **Lepachys columnaris pulcherrima.**

OCIMUM. O. Basilicum (Basil).

ODONTONEMA (page 3342). **O. Schomburgkianum** (Thyrsacanthus).

ODONTOSORIA. O. chinensis (Davallia).

ŒNOTHERA. Œ. acaulis.
— **biennis.**
— **bistorta.**
— **brachycarpa.**
— **cæspitosa.**
— **Drummondii.**
— *Fraseri:* **Œ. glauca Fraseri.**
— **fruticosa.**
— **glauca.**
— **Lamarckiana.**
— *macrocarpa:* **Œ. missouriensis.**
— **Pilgrimii.**
— **rosea.**
— **serrulata.**
— **speciosa.**
— **tetraptera.**
— *Whitneyi:* **Godetia grandiflora.**
— *Youngii:* **Œ. fruticosa Youngii.**

OLEA. *O. europæa (Olive).
— *fragrans:* ***Osmanthus fragrans.**

OMPHALODES. O. linifolia (Cynoglossum).

ONOCLEA. O. sensibilis.
— *Struthiopteris:* **Matteuccia Struthiopteris.**

ONOPORDON. O. tauricum.

ONYCHIUM. O. japonicum.

OPHIOGLOSSUM. O. vulgatum.

OPHIOPOGON. O. Jaburan.

OPLISMENUS. O. hirtellus (Panicum).

OPULASTER (adopted under American Code). *O. bracteatus:* ***Physocarpus bracteatus.**
— *glabratus:* ***P. glabratus.**
— *intermedius:* ***P. intermedius.**
— *monogynus:* ***P. monogynus.**
— *opulifolius:* ***P. opulifolius.**
— *pubescens:* ***P. malvaceus.**
— *Ramaleyi:* **P. bracteatus** or **P. intermedius.**

OPUNTIA. O. arenaria.
— **Camanchica.**
— **Ficus-indica.**
— **humilis.**
— **phæacantha.**
— **polyantha.**
— *Rafinesquii:* **O. humilis.**
— **vulgaris.**

ORCHIS. *O. spectabilis:* **Galeorchis spectabilis** (doubtfully separable from the genus Orchis; under that genus it is O. spectabilis).

OREODOXA. O. regia (Roystonea regia).

ORIGANUM. O. Majorana (Sweet Marjoram).

ORNITHOGALUM. O. arabicum.
— *pyramidale:* **O. narbonense pyramidale.**
— **umbellatum.**

OROBUS. *O. lathyroides:* **Vicia oroboides.**
— *niger:* **Lathyrus niger.**
— *vernus:* **Lathyrus vernus.**

ORONTIUM. O. aquaticum.

ORYZA. O. sativa (Rice).

OSMANTHUS. *O. Aquifolium.
—***Delavayi.**
—***fragrans** (Olea).

OSMUNDA. O. cinnamomea.
— **Claytoniana.**
— **gracilis;** probably a form of **O. regalis.**
— *palustris:* **O. regalis.**
— **regalis.**

OSTRYA. *O. virginica:* ***O. virginiana.**

OTHONNA. O. crassifolia.

OUVIRANDRA. *O. fenestralis:* **Aponogeton fenestralis.**

OXALIS. O. Acetosella.
— *alba:* a white form of either **O. lasiandra** or **O. variabilis.**
— *albiflora:* **O. variabilis.**
— **Bowiei.**
— **cernua.**
— **Deppei.**
— **lasiandra.**
— **rosea;** but **O. enneaphylla rosea** is perhaps sometimes meant.
— *tropæoloides:* **O. corniculata atropurpurea.**
— **valdiviensis.**
— **violacea.**

OXYDENDRUM. *O. arboreum (Andromeda).

PACHISTIMA. *P. Canbyi.

PACHYSANDRA. *P. terminalis.

PÆONIA. *P. albæ:* probably **P. decora alba.**
— **albiflora.**
— *anemonæflora:* **P. officinalis albo-plena.**
— *arborea:* **P. suffruticosa.**
— *chinensis:* **P. albiflora sinensis.**
— *edulis:* **P. albiflora.**
— *festiva:* either **P. albiflora festiva** or **P. officinalis festiva.**
— *Humei:* **P. suffruticosa Humei.**
— **lutea.**
— *Moutan:* **P. suffruticosa.**
— **officinalis.**
— *rosea:* Probably **P. suffruticosa rosea,** but possibly **P. officinalis albo-plena.**
— *rubra:* Cf. P. suffruticosa rubroplena.
— **suffruticosa.**
— **tenuifolia.**

There are many Latin names in the garden forms of Pæonia, as P. amabilis, atrorubra, bicolor, candidissima, chrysanthemiflora, Delachii, delicatissima, elegantissima, formosa, fragrantissima, gigantea, grandiflora, nigricans, papaveriflora, Pottsii, prolifera, pulcherrima, purpurea, rosea, Thorbeckii, triumphans, umbellata, and others.

PALAFOXIA. *P. Hookeriana:* **Polypteris Hookeriana.**

PALIURUS. *P. Spina-Christi.

PANAX. *P. gracillimum:* **Dizygotheca Veitchii gracillima.**
— *monstrosum:* **Polyscias Guilfoylei monstrosa.**

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PANAX continued.
— **quinquefolium** (Ginseng).
— *Victoriæ:* **Polyscias Guilfoylei Victoriæ.**
PANCRATIUM. *P. calathinum:* **Hymenocallis calathina.**
PANDANUS. **P. graminifolius**; sometimes misapplied to P. pygmæus.
— **pacificus.**
— **pygmæus.**
— **utilis.**
— **Veitchii.**
PANDOREA. ***P. australis** (Tecoma).
—***jasminoides** (Tecoma).
—***Ricasoliana** (Tecoma).
PANICUM. **P. sulcatum.**
— *variegatum:* **Oplismenus hirtellus.**
PAPAVER. **P. alpinum.**
— **bracteatum.**
— **dubium.**
— **glaucum.**
— *lævigatum:* **P. dubium lævigatum.**
— *Mursellii:* **a strain of P. somniferum.**
— **nudicaule.**
— **orientale.**
— *Parkmanii:* **P. orientale Parkmanii.**
— **pavoninum.**
— **pilosum.**
— **Rhœas.**
— **somniferum.**
— *umbrosum:* **P. Rhœas umbrosum.**
PAPYRUS. *P. antiquorum:* **Cyperus Papyrus.**
PARADISEA. **P. Liliastrum** (Anthericum).
PARDANTHUS. *P. chinensis:* **Belamcanda chinensis.**
— *sinensis:* **B. chinensis.**
PARITIUM. *P. elatum:* **Hibiscus elatus.**
— *tiliaceum:* **H. tiliaceus.**
PARKINSONIA. ***P. aculeata.**
PARNASSIA. **P. caroliniana.**
PARTHENOCISSUS (see Ampelopsis, Cissus, and Vitis). *P. Engelmannii:* **P. quinquefolia Engelmannii:** *Ampelopsis quinquefolia Engelmannii.
— **Henryana:** *A. Henryana.
— *Lowii:* **P. tricuspidata Lowii:** *A. tricuspidata Lowii.
— *muralis:* **P. quinquefolia murorum:** *A. quinquefolium murorum.
— **quinquefolia:** *A. quinquefolia.
— **Thomsonii:** *A. Thomsonii.
— **tricuspidata:** *A. tricuspidata.
— *Veitchii:* **P. tricuspidata Veitchii:** *A. tricuspidata Veitchii.
PASANIA. See Lithocarpus.
PASSIFLORA. **P. alato-cærulea.**
— **cærulea.**
— **coccinea.**
— **edulis.**
— **gracilis.**
— **incarnata.**
— **laurifolia.**
— **ligularis.**
— **lutea.**
— **manicata** (Tacsonia).
— **militaris.**
PASSIFLORA, continued.
— **mollissima** (Tacsonia).
— *Pfordtii:* **P. alato-cærulea.**
— *princeps:* **P. racemosa.**
— **quadrangularis.**
— **Van Volxemii.**
— **violacea.**
PASTINACA. **P. sativa** (Parsnip).
PAULLINIA. **P. thalictrifolia.**
PAULOWNIA. *P. imperialis:* ***P. tomentosa.**
PAVIA. *P. flava:* ***Æsculus octandra.**
— *macrostachya:* ***Æ. parviflora.**
— *nana:* ***Æ. Pavia humilis.**
— *rubra:* ***Æ. Pavia.**
PAVONIA. **P. hastata.**
PELARGONIUM. **P. acerifolium** (page 3570). (Geranium.)
— **domesticum.**
— **graveolens.**
— **hortorum.**
— **odoratissimum.**
— **peltatum.**
— **zonale** (Geranium).
PELLÆA. **P. atropurpurea.**
— **densa.**
— **viridis** (Pteris).
PELTANDRA. *P. virginica:* **P. undulata.**
PENNISETUM. *P. cupreum:* **a form of P. Ruppelii.**
— **japonicum** (Gymnothrix).
— **latifolium** (Gymnothrix).
— *longistylum:* **P. villosum.**
— *macrophyllum:* **P. macrostachyum.**
— *Ruppelianum:* **P. Ruppelii.**
— **villosum.**
PENTSTEMON. **P. acuminatus.**
— **antirrhinoides.**
— *atropurpureus:* **a color form of P. campanulatus.**
— **barbatus** (Chelone).
— *cæruleus:* **P. angustifolius.**
— **campanulatus.**
— **centranthifolius.**
— **Cobæa.**
— **cordifolius.**
— *cyananthus:* **P. glaber cyananthus.**
— **diffusus.**
— *Digitalis:* **P. lævigatus Digitalis.**
— **glaber.**
— **gloxinioides.**
— **grandiflorus.**
— **Hartwegii.**
— **heterophyllus.**
— **hirsutus.**
— **lævigatus.**
— **Murrayanus.**
— **ovatus.**
— *pubescens:* **P. hirsutus.**
— **secundiflorus.**
— **Smallii.**
— **spectabilis.**
PEPEROMIA. **P. maculosa.**
PERESKIA. **P. aculeata.**
PERILLA. *P. atropurpurea:* **a color form of P. frutescens laciniata.**
— *nankinensis:* **P. frutescens nankinensis.**
PERIPLOCA. ***P. græca.**
PERISTROPHE. **P. speciosa.**
PERNETTYA. ***P. mucronata.**
PERSEA. ***P. americana** (P. gratissima not tenable under the rules).
—***indica.**
PERSICA. *P. alba:* **Prunus Persica alba:** *Amygdalus Persica alba.
— *chrysanthemum:* **Pr. Persica** var.: *A. Persica chrysanthemum.
— *rubra:* **Pr. Persica** var.: *A. Persica rubra.
— *vulgaris:* **Pr. Persica:** *A Persica.
PETASITES. **P. fragrans.**
PETROSELINUM. **P. hortense** (Parsley).
PETUNIA. **P. hybrida.**
PHACELIA. **P. campanularia.**
— **congesta.**
— **linearis** (Eutoca).
— **Parryi.**
— **tanacetifolia.**
— **viscida** (Eutoca).
— **Whitlavia** (Whitlavia).
PHÆDRANTHUS. **P. buccinatorius.** *Bignonia buccinatoria.
PHALARIS. **P. arundinacea.**
PHASEOLUS. **P. aconitifolius.**
— **angularis.**
— **aureus.**
— **calcaratus.**
— **Caracalla.**
— **coccineus** (P. multiflorus).
— **lunatus.**
— *macrocarpus:* **P. lunatus macrocarpus.**
— *multiflorus:* **P. coccineus,** Linn. (P. multiflorus not tenable under the rules).
— *nanus:* **dwarf form of P. vulgaris.**
— **retusus.**
— **vulgaris.**
PHEGOPTERIS. **P. Dryopteris.**
— **hexagonoptera.**
— **polypodioides.**
PHELLODENDRON. ***P. amurense.**
—***sachalinense.**
PHILADELPHUS. *P. aureus:* ***P. coronarius fol. aureis.**
— *Billiardii:* ***P. pubescens Souvenir de Billiard.**
— *cordifolius:* ***P. Lewisii.**
—***coronarius.**
— *dianthiflorus:* ***P. coronarius flore-pleno.**
—***Falconeri.**
— *foliis aureis:* ***P. coronarius foliis aureis.**
— *Gordonianus:* ***P. Lewisii.**
—****grandiflorus:*** **P. coronarius grandiflorus, P. pubescens, or P. inodorus grandiflorus.**
— **hirsutus.**
—***incanus.**
—***inodorus**; but name also applied to P. hirsutus.
— *latifolius:* **P. pubescens.**
—***laxus.**
—***Lemoinei.**
—***Lewisii.**
—***Magdalenæ.**
—***microphyllus.**
— *nanus:* ***P. coronarius nanus.**
— **nepalensis**; but perhaps sometimes **P. coronarius tomentosus.**
— *nivalis:* **P. coronarius.**

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PHILADELPHUS, continued.
— **pubescens**; sometimes perhaps means **P. laxus.**
—***sericanthus.**
— *speciosissimus:* ***P. coronarius speciosissimus.**
— *speciosus:* ***P. laxus.**
—***Zeyheri.**

PHILLYREA. ***P. angustifolia** (Filaria).
—***decora** (Filaria).
—***latifolia.**

PHILODENDRON. **P. giganteum.**
— **spectabile.**

PHLEBODIUM. **P. aureum** (Polypodium.)

PHLEUM. **P. pratense** (Timothy).

PHLOMIS. **P. tuberosa.**

PHLOX. **P. amœna.**
— **Arendsii.**
— *carolina:* **P. ovata.**
— *cuspidata:* either **P. pilosa** or a form of **P. Drummondii stellaris.**
— *decussata:* probably **P. paniculata**, also **P. paniculata×maculata.**
— **divaricata.**
— **Drummondii.**
— **fimbriata:** a form of **P. Drummondii stellaris.**
— **glaberrima.**
— *grandiflora:* either a form of **P. Drummondii rotundata** or **P. subulata grandiflora.**
— **Heynholdii:** a form of **P. Drummondii rotundata.**
— **hortensiæflora:** a form of **P. Drummondii rotundata.**
— **maculata.**
— **ovata.**
— **paniculata.**
— **pilosa.**
— **Stellaria**; the name stellaris applies to forms of **P. Drummondii** and **P. subulata.**
— **subulata.**
— *suffruticosa:* **P. glaberrima suffruticosa.**
Latin names are applied to garden phloxes, particularly to forms of P. Drummondii and of P. paniculata × maculata.

PHŒNIX. ***P. canariensis.**
—***dactylifera.**
—***humilis.**
— *leonensis:* ***P. reclinata.**
—***pumila.**
—***reclinata.**
—***Roebelenii.**
—***rupicola.**
—***sylvestris.**
— *tenuis:* ***P. canariensis.**
—***zeylanica.**

PHORMIUM. **P. Cookianum.**
— **tenax.**

PHOTINIA. ***P. arbutifolia** (Heteromeles).
— *japonica:* ***Eriobotrya japonica.**
—***serrulata.**
—***villosa.**

PHYLLANTHUS. *P. disticha:* **P. acidus.**
— **nivosus.**

PHYLLITIS. **P. Scolopendrium** (Scolopendrium).

PHYLLOSTACHYS (see Bamboo). ***P. aurea.**
—***Boryana.**
—***Castillonis.**
—***Henonis.**
—***marliacea.**
—***mitis.**
—***nigra.**
—***Quilioi.**
—***ruscifolia.**
—***Veitchii.**
—***violescens.**
—***viridis.**

PHYLLOTÆNIUM. *P. Lindenii:* **Xanthosma Lindenii.**

PHYMATODES. **P. glaucum** (Polypodium).

PHYSALIS. **P. Alkekengi.**
— **Franchetii.**
— **ixocarpa.**
— **peruviana.**
— **pubescens.**

PHYSOCARPUS (Opulaster under the American Code). *P. aureus:* ***P. opulifolius luteus:** O. opulifolius luteus.
—***bracteatus:** O. bracteatus.
—***intermedius:** O. intermedius.
—***monogynus:** O. monogynus.
—***opulifolius** (Spiræa): O. opulifolius.
—***malvaceus:** O. malvaceus: O. pubescens.

PHYSOSTEGIA. *P. speciosa:* **P. virginiana speciosa.**

PICEA (see Abies). *P. ajanensis:* ***P. jezoensis.**
— *alba:* ***P. canadensis.**
—****Alcockiana:** **P. bicolor**; sometimes **P. jezoensis hondoensis.**
—***bicolor.**
—***canadensis.**
— *conica:* ***P. excelsa conica.**
— *Douglasii:* **Pseudotsuga taxifolia:** *Ps. Douglasii.
—***Engelmannii.**
—***excelsa.**
—***jezoensis.**
— *koraiensis:* not known botanically.
— *Kosteriana:* ***P. pungens Kosteri.**
—***mariana.**
—***Maximowiczii.**
— *Morinda:* ***P. Smithiana.**
— *nigra:* ***P. mariana.**
—***Omorika.**
—***orientalis.**
—***polita.**
—***pungens.**
—***rubra.**
—***sitchensis.**
—***Smithiana.**

PIERIS. ***P. floribunda** (Andromeda).
—***japonica** (Andromeda).
—***mariana** (Andromeda).

PILOGYNE. *P. suavis:* **Melothria punctata.**

PIMELEA. ***P. ferruginea.**

PIMENTA. **P. officinalis** (Allspice)

PIMPINELLA. **P. Anisum** (Anise).

PINANGA (page 3571). **P. decora.**
— **patula.**

PINUS. *P. aurea:* **P. Strobus aurea, P. densiflora aurea** or **P. sylvestris aurea.**

PINUS, continued.
— *australis:* ***P. palustris.**
— *austriaca:* ***P. nigra austriaca.**
—***Banksiana.**
—***canariensis.**
—***Cembra.**
—***contorta.**
—***Coulteri.**
—***densiflora.**
— *divaricata:* ***P. Banksiana.**
—***echinata.**
—***edulis.**
—***excelsa.**
—***flexilis.**
—***halepensis.**
— *inops:* ***P. virginiana.**
—***Jeffreyi.**
—***koraiensis.**
—***Lambertiana.**
— *Laricio:* ***P. nigra.**
— *maritima:* ***P. Pinaster.**
—***Massoniana**; applied also to **P. Thunbergii** and to **P. sinensis.**
— *mitis:* ***P. echinata.**
—***montana.**
—***monticola.**
— *Mughus:* ***P. montana Mughus.**
—***muricata.**
—****Murrayana:** **P. contorta latifolia.**
—***nigra.**
—***palustris.**
—***Parryana.**
—***parviflora.**
— **pentaphylla:** perhaps a form of **P. parviflora.**
—***Peuce.**
—***Pinaster.**
—***Pinea.**
—***ponderosa.**
—***pungens.**
—***radiata.**
—***resinosa.**
— *rigensis:* ***P. sylvestris rigensis.**
—***rigida.**
—***Sabiniana.**
— *scopulorum:* ***P. ponderosa scopulorum.**
—***Strobus.**
—***sylvestris.**
—***Thunbergii.**
—***Torreyana.**
— *uncinata:* ***P. montana uncinata.**
—***virginiana.**
— *Watereriana:* ***P. sylvestris Watereri** (page 3571).

PIPER. **P. nigrum** (Pepper).

PIQUERIA. **P. trinervia** (Stevia).

PISTACIA. ***P. atlantica.**
— *chinensis:* ***P. sinensis.**
—***Lentiscus.**
—***mutica.**
—***sinensis.**
—***vera.**

PISTIA. **P. Stratiotes.**

PISUM. **P. sativum** (Pea).

PITHECOCTENIUM. *P. clematideum:* ***P. cynanchoides.**

PITTOSPORUM. ***P. crassifolium.**
—***eugenioides.**
—***heterophyllum.**
—***phillyræoides.**
—***tenuifolium.**
—***Tobira.**
—***undulatum.**

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PLATANUS. *P. acerifolia (this is the tree usually planted as P. orientalis.)
—*occidentalis.
—*orientalis.
—*racemosa.

PLATYCERIUM. P. alcicorne.
— *Stemmaria:* P. æthiopicum.
— Willinckii.

PLATYCODON. *P. album:* P. grandiflorum album.
— grandiflorum (Campanula).
— *japonicum:* P. grandiflorum japonicum.
— *Mariesii:* P. grandiflorum Mariesii.

PLATYSTEMON. P. californicus.

PLUMBAGO. *P. capensis.
— *coccinea:* P. rosea coccinea.
— *Larpentæ:* Ceratostigma plumbaginoides.
— rosea.

PLUMERIA. P. acutifolia (Frangipani).

POA. *P. amabilis:* Eragrostis amabilis.
— compressa.
— pratensis.

PODOCARPUS. *P. macrophylla.
—*Nagi.

PODOPHYLLUM. P. emodi.
— peltatum.

POGONIA. P. ophioglossoides.

POINCIANA. *P. Gilliesii:* *Cæsalpinia Gilliesii.
—*regia.

POINSETTIA. **P. pulcherrima:* Euphorbia pulcherrima.

POLEMONIUM. P. cæruleum.
— *grandiflorum:* P. cæruleum himalayanum.
— *himalaicum:* probably P. cæruleum himalayanum.
— reptans.
— *Richardsonii:* P. humile.

POLYGALA. *P. brachypoda.
—*Dalmaisiana.
— paucifolia.
— Senega.
—*virgata.

POLYGONATUM. P. biflorum.
— commutatum.
— *giganteum:* P. commutatum.
— multiflorum.

POLYGONUM. P. affine.
— amplexicaule.
—*Aubertii.
—*baldschuanicum.
— *Brunonis:* P. affine.
— *compactum:* P. Sieboldii compactum.
—**cuspidatum:* P. Sieboldii.
—**multiflorum:* probably often misapplied to P amplexicaule.
— orientale.
— sericeum.
— Sieboldii.

POLYPODIUM. *P. aureum:* Phlebodium aureum.
— falcatum.
— *glaucum:* Phymatodes glaucum.
— subauriculatum (Goniophlebium).
— vulgare.

POLYPTERIS. P. Hookeriana (Palafoxia).

POLYSCIAS. P. Balfouriana (Aralia).
— filicifolia (Aralia).
— Guilfoylei (Aralia. Panax).

POLYSTICHUM (see Aspidium). P. acrostichoides.
— aculeatum.
— angulare.
— Braunii.
— cristatum.
— munitum.
— Tsus-sinense.

PONCIRUS. P. trifoliata: *Citrus trifoliata.

PONTEDERIA. P. cordata.

POPULUS. *P. acuminata.
—*alba.
—*angulata.
— *angustifolia:* *P. fortissima.
— *aurea:* *P. Van Geertii aurea, a form of P. serotina.
—*balsamifera.
—**Bolleana:* P. alba pyramidalis.
— *canadensis:* *P. deltoides.
—*candicans.
—*canescens.
— *carolinensis* (*Carolina Poplar). P. Eugenei, P. angulata (Hybrid *Carolina Poplar), and probably others; a group of hybrids in need of further study.
—*deltoides.
— Eugenei (Carolina P., in part)
— *fastigiata:* *P. nigra italica.
—*fortissima.
—*Fremontii.
— *græca:* P. grandidentata; perhaps sometimes P. tremuloides.
—*grandidentata.
— *italica:* *P. nigra italica.
—*Maximowiczii.
—**monilifera:* P. deltoides monilifera.
—*nigra.
— *pyramidalis:* usually means *P. nigra italica (Lombardy Poplar), but name likely to be used for other pyramidal forms, as P. alba pyramidalis and P. tremula pyramidalis.
—*Sargentii.
—*Simonii.
—*tremula.
—*tremuloides.
— suaveolens; but the plant in cultivation is *P. Maximowiczii.

PORTERANTHUS (name under American Code). *P. stipulacea:* Gillenia stipulata.

PORTULACA. *P. albiflora:* P. grandiflora albiflora.
— *aurea:* P. oleracea.
— grandiflora.
— oleracea (cultivated form).
— *Thellussonii:* P. grandiflora Thellussonii.
— *Thorburnii:* P. grandiflora Thorburnii.

POTENTILLA. P. atrosanguinea.
— *formosa:* P. nepalensis.
—*fruticosa.
— grandiflora.
— MacNabiana.
— O'Briana.

POTENTILLA, continued.
— pyrenaica.
— rupestris.
— *Russelliana:* hybrid.
—*tridentata.
— *Veitchii:* *P. fruticosa Veitchii.

POTHOS. *P. argyræa:* Scindapsus pictus argyræus.

PRIMULA. P. acaulis.
— Auricula.
— cærulea.
— *cashmeriana:* P. denticulata cachemiriana.
— *chinensis:* P. sinensis.
— cortusoides.
— *Croussei:* probably a garden form of P. acaulis.
— denticulata.
— elatior.
— farinosa.
— *fimbriata:* P. sinensis fimbriata or P. obconica fimbriata.
— Forbesii.
— *grandiflora:* applied to large-flowered forms of different species.
— japonica.
— kewensis.
— *lutea:* P. Auricula.
— malacoides.
— obconica.
— *officinalis:* P. veris.
— Polyantha.
— pulverulenta.
— rosea: P. obconica rosea or P. japonica rosea.
— Sieboldii.
— sinensis.
— veris.
— verticillata.
— *vulgaris:* P. acaulis.

PRITCHARDIA. P. pacifica (Styloma pacifica; see page 3279).

PRUNELLA (see Brunella). P. grandiflora.
— Webbiana.

PRUNUS (see Amygdalus, Cerasus, and Laurocerasus). *P. alleghaniensis.
—*americana.
— *Amygdalus:* P. communis: *Amygdalus communis.
— angustifolia.
—*Armeniaca (Apricot).
—*avium (Sweet Cherry).
—*Besseyi (Sand Cherry).
— caroliniana: *Laurocerasus caroliniana.
—*cerasifera.
—*Cerasus (Sour Cherry).
— communis (Almond): *A communis.
— Davidiana: *A. Davidiana.
—*demissa.
—*domestica (Common Plum).
—*fruticosa.
—*glandulosa (Cherry-Almond).
—*hortulana.
—*ilicifolia.
— *integrifolia:* *P. Lyonii.
—*japonica (Cherry-Almond); also applied to P. subhirtella pendula, one of the Japanese flowering cherries.
—*Lannesiana (Japanese Flowering Cherry).

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PRUNUS, continued.
— **Laurocerasus** (Laurus): *Laurocerasus officinalis.
— **lusitanica**: *Laurocerasus lusitanica.
—*Lyonii.
—*Mahaleb.
—*maritima.
— *melanocarpa:* *P. demissa melanocarpa.
—*Mume.
—*Munsoniana.
— *Myrobalana:* *P. cerasifera.
— **nana** (Russian Dwarf Almond): *Amygdalus nana.
—*nigra.
— *nucipersica:* P. Persica nucipersica (Nectarine): *A. Persica nectarina.
—*Padus (Bird Cherry).
— *pendula:* applied to weeping forms of several species, but oftenest to *P. subhirtella pendula, one of the Japanese flowering cherries.
—*pennsylvanica.
— **Persica** (Peach): *A. Persica.
— *Pissardii:* *P. cerasifera Pissardii.
— *platycarpa:* P. Persica platycarpa (Flat Peach): *A. Persica platycarpa.
— *Pseudo-Cerasus:* *P. serrulata; also incorrectly used as a general name for other Japanese flowering cherries, as P. Lannesiana, P. Sieboldii, P. yedoensis; the true P. Pseudo-Cerasus is not in commerce in this country, and is tender.
—*pumila; also applied to dwarf forms of other species.
— *Rhexii:* *P. Cerasus Rhexii.
— *sachalinensis:* *P. serrulata sachalinensis.
—*salicina (Japanese Plum. Prunus triflora).
— *Sargentii:* *P. serrulata sachalinensis.
— *semperflorens:* *P. Cerasus semperflorens.
—*serotina.
—*serrulata.
— *sibirica:* *P. Armeniaca sibirica.
—*Sieboldii (Japanese Flowering Cherry).
—*Simonii.
— *sinensis:* probably P. glandulosa and P. japonica (Cherry-Almonds).
—*spinosa.
—*subhirtella (Japanese Flowering Cherry).
—*tomentosa.
— *triflora:* *P. salicina.
— **triloba** (Flowering Almond). *A. triloba.
—*virginiana (Choke-Cherry).
— *Watsonii:* *P. angustifolia Watsonii (Sand Plum).
—*yedoensis.

PSEUDOLARIX. *P. Fortunei:* *P. Kaempferi.
—*Kaempferi.

PSEUDOTSUGA. *P. Douglasii:* P. taxifolia (Picea. Tsuga).
—*macrocarpa.

PSIDIUM. *P. Cattleianum.
—*Friedrichsthalianum.
—*Guajava.

PTELEA. *P. aurea:* *P. trifoliata aurea.
—*trifoliata.

PTERIDIUM (doubtfully separable from Pteris). P. aquilinum (Pteris).

PTERIS. *P. adiantoides:* not known botanically.
— *aquilina:* Pteridium aquilinum.
— *argyræa:* P. quadriaurita argyræa.
— **Childsii**: a form of P. cretica.
— **cretica.**
— *hastata:* Pellæa viridis.
— *internata:* Pt. heterophylla internata.
— *Mayii:* Pt. cretica Mayii.
— *nobilis:* Pt. cretica nobilis.
— *Ouvrardii:* Pt. serrulata Ouvrardii.
— *Rivertoniana:* a form of Pt. cretica.
— **serrulata.**
— *Sieboldii:* a form of Pt. cretica.
— **tremula.**
— *Wilsonii:* Pt. cretica Wilsonii.
— *Wimsettii:* a variation of Pt. cretica.

PTEROCARYA. *P. fraxinifolia.
—*stenoptera.

PTEROSTYRAX. *P. corymbosa.
—*hispida.

PTYCHORAPHIS. P. singaporensis.

PTYCHOSPERMA. *P. Alexandræ:* Archontophœnix Alexandræ.
— *Cunninghamii:* A. Cunninghamii.
— *elegans:* A. Alexandræ and A. Cunninghamii; the palm cultivated in California under this name is recently named Loroma amethystina (see Seaforthia, page 3123).
— *singaporensis:* Ptychoraphis singaporensis (page 3571).

PUERARIA. *P. Thunbergiana:* P. hirsuta (Dolichos).

PULMONARIA. P. angustifolia.
— *azurea:* P. angustifolia azurea.
— *maculata:* P. officinalis.
— **saccharata.**

PUNICA. *P. Granatum.
— *Legrellei:* a form of P. Granatum.
— *nana:* *P. Granatum nana.

PYRACANTHA. *P. angustifolia (Cotoneaster).
—*coccinea.
—*crenulata (Cotoneaster).
— *Lalandii:* *P. coccinea Lalandii.

PYRETHRUM. *P. atrosanguineum:* a variation of Chrysanthemum coccineum.
— *aureum:* C. Parthenium aureum.
— *corymbosum:* C. corymbosum.
— *hybridum:* C. coccineum.
— *parthenifolium:* C. Parthenium.
— *roseum:* C. coccineum.
— *selaginoides:* C. Parthenium selaginoides.
— *Tchihatchewii:* C. Tchihatchewii.
— *uliginosum:* C. uliginosum.

PYROSTEGIA. P. venusta: *Bignonia venusta.

PYRUS. *P. americana:* *Sorbus americana.

PYRUS, continued.
— **angustifolia**: *Malus angustifolia.
— *arbutifolia:* *Aronia arbutifolia.
— *Arnoldiana:* P. pulcherrima Arnoldiana: *Malus Arnoldiana.
— **atrosanguinea**: *Malus atrosanguinea.
— *Aucuparia:* *Sorbus Aucuparia.
— **baccata**: *Malus baccata.
— **cerasifera**: *M. cerasifera.
—*communis (Pear).
— **coronaria**: *M. coronaria.
— **Dawsoniana** (hybrid): *M. Dawsoniana.
— **florentina** (P. crataegifolia): *M. florentina.
— *floribunda:* P. pulcherrima: *M. floribunda.
— **fusca**: *M. fusca.
— **Halliana**: *M. Halliana.
— **ioensis**: *M. ioensis.
— **Malus** (Apple): *M. sylvestris.
— *Niedzwetzkyana:* P. Malus Niedzwetzkyana: *M. Niedzwetzkyana.
— *nigra:* *Aronia melanocarpa.
— *Parkmanii:* P. Halliana Parkmanii: *M. Parkmanii.
— **prunifolia**: *M. prunifolia.
— **pulcherrima**: *M. floribunda.
— *quercifolia:* Sorbus hybrida: *S. quercifolia.
— *Ringo:* P. prunifolia Rinki: *M. prunifolia Rinki.
— **Sargentii**: *M. Sargentii.
— *Scheideckeri:* P. pulcherrima Scheideckeri: *M. Scheideckeri.
—*serotina (Japan Pear).
— **Sieboldii**: *Malus Toringo.
— *Sorbus:* *Sorbus domestica.
— **Soulardii**: *Malus Soulardii.
— **spectabilis**: *Malus spectabilis.
— *Toringo:* P. Sieboldii: *M. Toringo.
— **Zumi**: *M. Zumi.

QUAMOCLIT. Q. coccinea (Ipomœa. Mina).
— **lobata** (Mina).
— **pinnata** (Ipomœa).

QUERCUS. *Q. acuta.
—*agrifolia.
—*alba.
— *aquatica:* *Q. nigra.
— *Banisteri:* *Q. ilicifolia.
—*bicolor.
—*Cerris.
—*coccinea.
— *Concordia:* *Q. Robur Concordia.
— *cuspidata:* *Castanopsis cuspidata (see Vol. V, page 2891).
—*dentata; but sometimes applied to Q. glandulifera.
—*Douglasii.
— *Duavessei:* *Q. Robur Dauvessei.
—*falcata.
— *ferruginea:* *Q. marilandica.
—*Garryana.
—*glauca.
—*Ilex.
—*ilicifolia.
—*imbricaria.
—*Kelloggii.
—*laurifolia.
—*lobata.
—*lyrata.
—*macrocarpa.

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QUERCUS, continued.
—*marilandica.
—**Michauxii* (Basket Oak): Q. Prinus.
— montana (see Q. Prinus, below).
—*nigra.
— *obtusiloba:* *Q. stellata.
—*palustris.
— *pannonica:* *Q. conferta.
— *pectinata:* *Q. Robur pectinata.
— *pedunculata:* *Q. Robur.
—*Phellos.
— *platanoides:* *Q. bicolor.
— Prinus (Basket Oak); applied in the trade to the *Chestnut Oak only, which is Q. montana of the Cyclopedia but for which others retain the name Q. Prinus and apply Q. Michauxii to the Basket Oak: *Q. Michauxii.
—**Prinus* (*Chestnut Oak): Q. montana.
— *pyramidalis:* *Q. Robur fastigiata.
—*Robur.
—*rubra.
— *sempervirens:* *Q. virginiana.
—*Suber.
— *tinctoria:* *Q. velutina.
—*velutina.
—*virginiana.

RADICULA. R. Armoracia (Horseradish). Preferably Roripa Armoracia.
— Nasturtium-aquaticum (Water-Cress. Preferably Roripa Nasturtium).
RAJANIA. R. pleioneura.
RANUNCULUS. R. aconitifolius.
— acris.
— amplexicaulis.
— asiaticus.
— bulbosus.
— gramineus.
— repens.
— *speciosus:* R. bulbosus.
RAPHANUS. R. sativus (Radish).
RAPHIOLEPIS. *R. indica.
— *japonica:* *R. umbellata.
— *ovata:* *R. umbellata ovata.
REHMANNIA. R. angulata.
REINWARDTIA. R. trigyna (Linum)
RESEDA. R. odorata.
RETINOSPORA, but properly spelled Retinispora. (There is no such genus, the plants referred to it being all juvenile states of the genera Chamæcyparis and Thuja.)
The American Joint Committee has starred the names of the plants under Thuja and Chamæcyparis, but recognizes the value of retaining Retinispora as a trade name for these forms as indicated by stars in parentheses below (*). It is preferable to use Retinispora as a common name in connection with the correct starred botanical name.
—(*)*ericoides:* *Thuja occidentalis ericoides; perhaps sometimes applied to Chamæcyparis thuyoides ericoides.
—(*)*filicoides:* *C. obtusa filicoides.

RETINOSPORA, continued.
—(*)*filifera:* C. pisifera filifera.
—(*)*leptoclada:* probably the trade plant is *C. thyoides andeleyensis.
—(*)*obtusa:* *C. obtusa.
—(*)*pisifera:* *C. pisifera.
—(*)*plumosa:* *C. pisifera plumosa.
—(*)*squarrosa:* *C. pisifera squarrosa; probably applied also to Thuja orientalis decussata.
—(*)*Veitchii.* *C. pisifera squarrosa.
RHAMNUS. *R. Alaternus.
—*alpina; trade plant is probably R. fallax.
—*californica.
— *carolina:* *R. caroliniana.
—*cathartica.
—*crenata; name sometimes misapplied to R. dahurica.
—*dahurica; sometimes cultivated as R. crenata.
—*Frangula.
—*imeretina.
—*Purshiana.
RHAPIS. R. flabelliformis.
— humilis.
RHEUM. R. Collinianum.
— palmatum.
— Rhaponticum (Rhubarb).
RHEXIA. R. virginica.
RHODANTHE. *R. maculata:* Helipterum Manglesii maculatum.
— *Manglesii:* H. Manglesii.
RHODOCHITON. R. volubile.
RHODODENDRON. R. arborescens: *Azalea arborescens.
—*arboreum.
—*arbutifolium.
— calendulaceum: *A. lutea.
— canadense: *Rhodora canadensis.
— canescens: *A. canescens.
—*carolinianum.
—*catawbiense.
—*ferrugineum.
—*hirsutum.
— indicum: *A. indica.
— japonicum: *A. japonica.
— Kaempferi: *A. Kaempferi.
— ledifolium: *A. ledifolia.
— luteum: *A. pontica.
—*maximum.
— Morteri: *A. gandavensis.
—*myrtifolium, but also R. Kotschyi.
— nudiflorum: *A. nudiflora.
— obtusum amœnum: *A. amœna.
— obtusum Hinodigiri: *A. Hinodigiri.
— occidentale: *A. occidentalis.
—*ponticum.
— poukhanense yodogawa: *A. yodogawa.
—*præcox.
—**punctatum:* R. minus.
— racemosum.
— *roseum:* R. maximum roseum.
— sinense: *A. mollis.
—*Smirnovii.
— Vaseyi: *A. Vaseyi.
— viscosum: *A. viscosa.
— *Wilsonianum:* *R. læte virens (page 3571).
RHODORA. **R. canadensis:* Rhododendron canadense.

RHODOTYPOS. *R. kerrioides.
RHOPALOSTYLIS. R. Baueri (Areca).
— sapida (Areca).
RHUS. *R. ailanthifolia:* possibly R. ailanthoides, which is Picrasma quassioides.
— *aromatica:* R. canadensis.
—*canadensis.
—*copallina.
—**cotinoides:* Cotinus americanus.
—**Cotinus:* C. Coggygria.
—*glabra.
— *Osbeckii:* *R. javanica.
—*trilobata.
—*typhina.
RHYNCHOSPERMUM. *R. jasminoides:* *Trachelospermum jasminoides.
RIBES. *R. alpinum.
— *atrosanguineum:* *R. sanguineum atrorubens.
— aureum; the fragrant plant cultivated as R. aureum is *R. odoratum.
—*cereum.
—*Cynosbati.
— *floridum:* *R. americanum.
—*glandulosum.
—*Gordonianum.
—*inerme.
— *longiflorum:* *R. odoratum.
—*nigrum (Black Currant).
—*odoratum.
— *prostratum:* *R. glandulosum.
—*sanguineum.
— *saxosum:* the plant in the trade under this name is *R. inerme.
—*vulgare (Red and White Currants).
RICHARDIA. *R. æthiopica:* Zantedeschia æthiopica.
— *albo-maculata:* Z. albo-maculata.
— *Elliottiana:* Z. Elliottiana.
RICINUS. *R. bourboniensis:* R. communis bourboniensis.
— *cambogensis:* R. communis cambogensis.
— communis.
— *Gibsonii:* R. communis Gibsonii.
— *hybridus:* R. communis hybridus.
— *macrocarpus:* R. communis macrocarpus.
— *macrophyllus:* R. communis macrophyllus.
— *panormitans:* R. communis panormitans.
— *philippinensis:* R. communis philippinensis.
— *purpureus:* R. communis purpureus.
— *sanguineus:* R. communis sanguineus.
— *zanzibarensis:* R. communis zanzibarensis.
The common Castor-bean plant, R. communis, gives rise to many marked forms, some of them having received Latin names.
RIVINA. R. humilis.
ROBINIA. *R. Bessoniana:* *R. Pseudacacia Bessoniana.
— *Decaisneana:* *R. Pseudacacia Decaisneana.
—*hispida.

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ROBINIA, continued.
— *inermis:* probably *R. **Pseudacacia inermis** or **R. Pseudacacia umbraculifera,** but sometimes possibly used to designate **R. hispida macrophylla.**
—*Kelseyi.
—*neo-mexicana.
—*Pseudacacia.
— *semperflorens:* *R. **Pseudacacia semperflorens.**
—*viscosa.

ROCHEA. R. coccinea (Crassula).

RODGERSIA. P. podophylla.
— **tabularis.**

ROMNEYA. *R. Coulteri.

RORIPA. A. Armoracia (Horse-radish. Radicula).
— **Nasturtium** (Water-Cress. Nasturtium. Radicula).

ROSA. *R. **arkansana;** the material cultivated under this name may be **R. heliophila.**
—*Banksiæ.
—*blanda.
—*bracteata (McCartney Rose).
—*canina.
— carolina: *R. humilis.
—*carolina; the plant usually cultivated under this name is **R. palustris.**
—*cinnamomea.
—*coriifolia.
— *Engelmannii:* *R. **acicularis Engelmannii.**
— *Fendleri:* *R. **Woodsii Fendleri.**
— *ferruginea:* *R. **rubrifolia.**
—*gymnocarpa.
—**humilis:* R. carolina.
—*lævigata (Cherokee Rose).
—**lucida:* R. **virginiana.**
—*macrophylla.
—*multiflora.
—*nitida.
—*nutkana.
— palustris: *R. carolina.
—**polyantha:* hybrids of **R. multiflora**×**R. chinensis.**
—*rubiginosa.
—*rubrifolia.
—*rugosa.
— *Sayi:* *R. **acicularis Bourgeauiana.**
—*setigera.
—*spinosissima.
— virginiana: *R. lucida.
—*Wichuraiana.
—*Woodsii.

ROSMARINUS. *R. **officinalis.**

ROYSTONEA. See Oreodoxa.

RUBUS. *R. **allegheniensis** (High-bush Blackberry).
—*argutus (High-bush Blackberry).
—*canadensis; if trade plant is a dewberry, it is probably **R. procumbens.**
—*cratægifolius.
—*deliciosus.
—*dumetorum.
—*ellipticus.
—*hispidus.
—*idæus.
—*illecebrosus.
—*laciniatus.

RUBUS, continued.
—*leucodermis.
—*Linkianus.
—*neglectus.
—*occidentalis.
—*odoratus.
—*palmatus.
—*phœnicolasius.
—*procumbens (Eastern Dewberry).
—*rosæflorus (this name is sometimes applied to the strawberry-raspberry, R. illecebrosus).
—*strigosus.
—*trivialis (Southern Dewberry).
— *ursinus:* *R. **vitifolius.**
— *villosus:* *R. **procumbens** if dewberry is meant,*R. **allegheniensis** if high-bush blackberry is meant.
—*vitifolius (Western Dewberry).

RUDBECKIA. R. amplexicaulis.
— **bicolor.**
— **californica.**
— **fulgida.**
— **hirta.**
— **laciniata.**
— **lanceolata.**
— **maxima.**
— *Newmannii:* **R. speciosa.**
— **nitida.**
— *purpurea:* **Echinacea purpurea.**
— **speciosa.**
— **subtomentosa.**
— *superba:* **R. bicolor superba.**
— **triloba.**

RUELLIA. R. amœna (Stephanophysum).

RUMEX. R. hymenosepalus.
— **Patientia.**
— **scutatus.**

RUSCUS. *R. **aculeatus.**

RUSSELIA. R. elegantissima.

RUTA. R. graveolens (Rue).

SABAL. *S. Adansonii:* **S. glabra.**
— **Blackburniana.**
— **Ghiesbrechtii.**
— *mexicana:* **S. texana.**
— **Palmetto.**
— **texana.**
— *umbraculifera:* **S. Blackburniana.**

SABATIA. S. campestris.
— *chloroides:* **S. dodecandra;** but stock is probably mostly **S. Kennedyana.**

SACCHARUM. S. officinarum (Sugar-cane).

SAGINA. S. subulata.

SAGITTARIA. *S. japonica:* **S. sagittifolia flore-pleno.**
— **montevidensis.**
— *natans:* probably **S. subulata,** but possibly the true **S. natans.**
— *sinensis:* probably a form of **S. sagittifolia,** usually known as S chinensis.

SAINTPAULIA. S. ionantha.

SALISBURIA. *S. adiantifolia:* *Ginkgo biloba.

SALIX (see, also, page 3571). *S. **acutifolia.**
—*alba; also applied to forms of S. rubens.
—*ambigua.
— *americana:* *S. **purpurea pendula.**

SALIX, continued.
—*amygdalina.
— *appendiculata:* *S. **grandifolia.**
— *aurita*×*phylicifolia:* *S. **ludificans**
—*babylonica (Weeping Willow).
— *babylonica dolorosa:* *S. **blanda.**
— *bicolor:* *S. **phylicifolia.**
—*blanda (Wisconsin Weeping Willow).
— *britzensis:* *S. **vitellina britzensis.**
— *bullata:* *S. **fragilis bullata** (page 3571).
— *cærulea:* *S. **alba calva.**
—*Caprea.
—*cinerea.
—*cordata.
—*daphnoides.
—*discolor.
— *dolorosa:* *S. **blanda.**
— *Elæagnos:* *S. **incana.**
—*elegantissima (Thurlow's Weeping Willow); probably also applied otherwise.
—*Erdingeri.
—*fragilis (Brittle Willow).
—*glabra.
— *glabra filicifolia:* *S. **gracilistyla.**
— *glabra tiliæfolia:* *S. **gracilistyla.**
—*gracilistyla.
—*grandifolia.
—*hastata.
—*hexandra.
— *holosericea:* *S. **stipularis.**
—*humilis.
—*incana.
—*irrorata (Colorado Willow).
—*japonica (Japanese Weeping Willow).
— *laurifolia:* *S. **pentandra.**
—*longifolia.
—*lucida.
—*ludificans.
—*myrsinifolia.
—*myrtilloides.
—*nigra.
— *nigricans:* *S. **myrsinifolia.**
—*pentandra.
—*petiolaris; but misapplied to **S. incana.**
— *Petzoldii:* *S. **blanda.**
—*phylicifolia.
—*Piperi.
— *pontederana:* *S. **sordida.**
—*purpurea.
—**regalis* (Royal Willow): **S. alba splendens.**
—*repens.
— *rosmarinifolia:* *S. **incana,** not S. rosmarinifolia of botanists.
—*rubens.
— *sacramentana:* probably a form of *S. **fragilis.**
—*sericea.
—*sesquitertia.
—*Sieboldiana.
— *Sieboldii:* probably *S. **elegantissima.**
—*sordida.
—*stipularis.
—*viminalis (Osier Willow).
—*vitellina (Yellow Willow).

SALPIGLOSSIS. *S. azurea:* **S. sinuata azurea.**
— *grandiflora:* **S. sinuata.**
— **sinuata.**

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SALVIA. S. argentea.
— azurea.
— bicolor; trade plant possibly S. splendens bicolor or S. coccinea bicolor.
— coccinea; possibly sometimes applied in the trade to S. splendens.
— farinacea.
— globosa.
—*Greggii.
— Horminum.
— involucrata.
— leucantha.
— officinalis (Sage).
— patens.
— *Pitcheri:* S. azurea grandiflora.
— pratensis.
— *rubicunda:* S. pratensis rubicunda.
— Sclarea.
— *spelmina:* probably S. Verbenaca.
— splendens.
— uliginosa.
— Verbenaca.
— verticillata.
— virgata; but may apply also to S. nemorosa.

SAMBUCUS. *S. acutiloba:* *S. canadensis acutiloba.
— *arborescens:* *S. pubens arborescens.
— *aurea:* *S. nigra aurea or S. canadensis aurea.
—*canadensis.
— *glauca:* *S. cærulea.
— *maxima:* *S. canadensis maxima.
—*nigra.
—*pubens.
—*racemosa.
— *tenuifolia:* *S. racemosa tenuifolia.

SANGUINARIA. S. canadensis.

SANGUISORBA. S. canadensis.

SANSEVIERIA. S. zeylanica.

SANTOLINA. S. Chamæcyparissus.
— *incana:* S. Chamæcyparissus incana.
— *maritima:* probably Diotis candidissima.

SANVITALIA. S. procumbens.

SAPIUM. *S. sebiferum.

SAPONARIA. S. calabrica.
— *caucasica:* S. officinalis caucasica.
— ocymoides.
— officinalis.
— Vaccaria.

SARRACENIA. S. Catesbæi.
— Drummondii.
— flava.
— psittacina.
— purpurea.
— rubra; but may be also S. Drummondii rubra.
— *variolaris:* S. minor.

SASSAFRAS. *S. officinale:* *S. variifolium.

SATUREIA. S. alpina (Calamintha).
— hortensis (Summer Savory). (Calamintha).
— montana.

SAURURUS. S. cernuus.

SAXIFRAGA. S. Aizoon.
— Burseriana.
— cordifolia.

SAXIFRAGA, continued.
— Cotyledon.
— crassifolia.
— lingulata.
— *orbicularis:* S. crassifolia orbicularis.
— peltata.
— *pyramidalis:* S. Cotyledon pyramidalis.
— sarmentosa.
— *speciosa:* a confused name; it may be S. ligulata speciosa, S. Burseriana speciosa, S. sancta speciosa, or S. oppositifolia speciosa; most probably S. Burseriana speciosa.
— squarrosa.
— umbrosa.
— *Van Houttei:* a variation of S. crassifolia.
— virginiensis.

SCABIOSA. S. atropurpurea.
— *candidissima:* S. atropurpurea candidissima.
— caucasica.
— japonica.
— *maxima:* S. atropurpurea grandiflora.
— *minor:* S. atropurpurea nana.
— ochroleuca.

SCHINUS. *S. Molle.
—*terebinthifolius.

SCHIZANTHUS. S. Grahamii.
— *grandiflorus:* S. pinnatus.
— *hybridus:* not placed botanically.
— *papilionaceus:* S. pinnatus papilionaceus.
— pinnatus.
— retusus.
— wisetonensis.

SCHIZOPETALON. S. Walkeri.

SCHIZOPHRAGMA. *S. hydrangeoides; but the plant in cultivation very often is Hydrangea petiolaris.
— *integrifolium.

SCHIZOSTYLIS. S. coccinea.

SCHLUMBERGERA. S. Russelliana (Epiphyllum).

SCIADOPITYS. *S. verticillata.

SCILLA. S. bifolia.
— *campanulata:* S. hispanica.
— *maritima:* Urginea Scilla.
— *nutans:* S. nonscripta.
— peruviana.
— sibirica.

SCINDAPSUS. S. pictus argyræus (Pothos).

SCIRPUS. S. atrovirens.
— cernuus (Isolepis).
— Tabernæmontanus; a form of S. lacustris.

SCOLOPENDRIUM. *S. officinarum:* Phyllitis Scolopendrium.
— *vulgare:* P. Scolopendrium.

SCOLYMUS. S. hispanicus.

SCORZONERA. S. hispanica.

SCUTELLARIA. S. baicalensis.
— *cælestina:* S. baicalensis cælestina.

SEAFORTHIA. *S. elegans:* Archontophœnix Alexandræ and A. Cunninghamii (see Seaforthia, page 3123).

SECHIUM. S. edule (Chayota).

SEDUM. S. acre.
— Aizoon.
— alboroseum.
— album; but in some cases possibly S. acre album, S. brevifolium album or S. spectabile album.
— Anacampseros.
— *atropurpureum:* S. maximum hæmatodes or S. spectabile atropurpureum.
— brevifolium.
— cæruleum.
— *carneum:* S. sarmentosum carneum.
— *cruciatum:* S. monregalense.
— dasyphyllum.
— Ewersii.
— *glaucum:* may apply to S. reflexum albescens, S. dasyphyllum, S. hispanicum or S. lydium glaucum.
— hispanicum.
— hybridum; but may be S. Middendorffianum hybridum or S. Telephium hybridum.
— japonicum; but material is mostly S. alboroseum.
— kamtschaticum.
— lydium.
— Maximowiczii.
— maximum.
— Middendorffianum.
— monregalense.
— oppositifolium.
— pallidum: probably S. hispanicum, but may be true S. pallidum.
— populifolium.
— pulchellum; but may apply to S. sexangulare.
— reflexum.
— sarmentosum.
— sempervivoides.
— sexangulare.
— Sieboldii.
— *speciosum:* unknown botanically.
— spectabile.
— *spurium:* S. stoloniferum.
— Stahlii.
— stoloniferum.
— telephoides.
— Telephium.
— *turkestanicum:* S. Ewersii turkestanicum.

SELAGINELLA. *S. amœna:* S. caulescens.
— apus.
— *cæsia:* S. uncinata.
— cuspidata.
— Emmeliana.
— flabellata.
— Kraussiana.
— Martensii.
— rupestris.

SELENICEREUS. S. pteranthus (Cereus nycticalus).

SEMPERVIVUM. *S. acuminatum:* S. glaucum.
— arachnoideum.
— arenarium.
— *cornutum:* S. hirtum
— fimbriatum.
— globiferum.
— Mettenianum.

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SEMPERVIVUM, continued.
— **pyrenaicum;** but perhaps **S. tectorum pyrenaicum.**
— **soboliferum;** this name is commonly used for **S. globiferum.**
— **tectorum.**
— *violaceum:* probably **S. tectorum violaceum.**

SENECIO. S. Cineraria.
— *clivorum:* **Ligularia clivorum.**
— **cruentus** (Cineraria).
— **elegans** (Jacobæa).
— *Kaempferi:* **L. Kaempferi.**
— **mikanioides** (German Ivy).
— **pulcher.**
— **scandens;** some of the stock is perhaps **S. mikanioides.**
— **tanguticus.**
— *Wilsonianus:* **L. Wilsoniana.**

SEQUOIA (Wellingtonia). ***S. gigantea.**
—***sempervirens.**

SERENOA. *S. serrulata.

SETARIA. S. italica (Millet).

SHEPHERDIA. (Lepargyrea in American Code). ***S. argentea.**

SHORTIA. *S. californica:* **Actinolepis coronaria.**
—***galacifolia.**

SICANA. S. odorifera.

SIDALCEA. S. candida.
— **malvæflora.**

SILENE. S. acaulis.
— **alpestris.**
— **Armeria.**
— **maritima.**
— **orientalis.**
— **pendula.**
— **pennsylvanica.**
— **Saxifraga.**
— **Schafta.**
— **virginica.**

SILPHIUM. S. laciniatum.
— **perfoliatum.**

SINAPIS. See Brassica.

SINNINGIA. S. speciosa (Gloxinia of florists).

SISYRINCHIUM. *S. bermudianum:* **S. angustifolium.**

SITOLOBIUM. *S. cicutarium:* **Dennstædtia cicutaria.**

SKIMMIA. *S. japonica.

SMILACINA (Vagnera in American Code.) *S. bifolia:* **Maianthemum bifolium.**
— **racemosa.**

SMILAX. *S. hispida.

SMILAX of florists: See Asparagus.

SOJA. See Glycine.

SOLANUM. S. Capsicastrum.
—***Dulcamara** (Bitter-Sweet).
— **giganteum.**
—***Hendersonii.**
— **integrifolium.**
—***jasminoides.**
— **Melongena** (Eggplant).
— *Melvinii:* **S. Capsicastrum Melvinii.**
— **muricatum** (Pepino).
— **nigrum.**

SOLANUM, continued.
—***Pseudo-Capsicum** (Jerusalem Cherry).
—***Rantonettii.**
—***Seaforthianum.**
— **tuberosum** (Potato).
— **Warscewiczii.**
—***Wendlandii.**

SOLIDAGO. S. cæsia.
— **canadensis.**
— **nemoralis.**
— **odora.**
— **spectabilis.**
— **Virgaurea.**
Many native species of Solidago may appear in the lists, for which consult the current manuals of botany.

SOLLYA. *S. heterophylla.

SOPHORA. *S. japonica.
—***tetraptera.**

SORBARIA (mostly sold as Spiræa). ***S. Aitchisonii.**
—***arborea.**
—***Lindleyana.**
—***sorbifolia.**

SORBUS (often named under Pyrus). ***S. americana** (American Mountain-Ash).
—***Aria.**
—***Aucuparia** (European Mountain Ash).
—***domestica.**
— **hybrida:** *S. quercifolia.

SPARAXIS. S. grandiflora (usually not sold under the species-name).

SPARTIUM. *S. junceum.
— *scoparium:* ***Cytisus scoparius.**

SPECULARIA. S. Speculum (Campanula).

SPERGULA. S. sativa (Spurry).

SPHÆRALCEA. S. cisplatina (Malva miniata).

SPHENOGYNE. *S. speciosa:* **Ursinia pulchra.**

SPIGELIA. S. marilandica.

SPINACIA. S. oleracea (Spinach).

SPIRÆA. *S. Aitchisonii:* ***Sorbaria Aitchisonii.**
—***alba;** an American plant usually catalogued as S. salicifolia, which is Asiatic.
— *argentea:* ***S. canescens.**
—***arguta.**
— *ariæfolia:* ***Holodiscus discolor ariæfolius.**
— *Aruncus:* **Aruncus sylvester.**
— *Astilbe* (see Astilbe).
— *astilboides:* **Astilbe astilboides.**
—***Billardii.**
— *bracteata:* ***S. nipponica.**
—***Bumalda.**
—***callosa:** **S. japonica.**
— **canescens.**
— **cantoniensis:** *S. Reevesiana.
— *carpinifolia:* ***S. latifolia.**
—***chinensis.**
— *Davidii:* Astilbe Davidii.
—***Douglasii.**
— *Filipendula:* Filipendula hexapetala.

SPIRÆA, continued.
— *floribunda:* probably **Astilbe astilboides floribunda.**
—***Fortunei:** **S. japonica Fortunei.**
—***Froebelii:** **S. Bumalda Froebelii.**
— *gigantea:* **Filipendula camtschatica.**
—***Henryi.**
— *Humboldtii:* **Aruncus sylvester.**
—***japonica;** often misapplied to Astilbe japonica.
— *kamtschatica:* **Filipendula camtschatica.**
— *Kneiffii:* **Aruncus sylvester Kneiffii.**
—***latifolia;** an American plant usually catalogued as S. salicifolia, which is Asiatic.
— *Lindleyana:* ***Sorbaria Lindleyana.**
— *lobata:* **Filipendula rubra.**
—***Margaritæ.**
—***multiflora.**
— **nipponica.**
— *opulifolia:* **Physocarpus opulifolia:** *Opulaster opulifolia.
— *palmata:* **Filipendula purpurea.**
—***prunifolia.**
—***pyramidata.**
—***Reevesiana:** **S. cantoniensis.**
—***Rosthornii.**
— *rotundifolia:* ***S. nipponica rotundifolia.**
— **salicifolia;** an Asiatic plant; name often misapplied to ***S. alba** and ***S. latifolia.**
—***semperflorens.**
— *sorbifolia:* ***Sorbaria sorbifolia.**
— **Thunbergii.**
—***tomentosa.**
—***trilobata.**
— *Ulmaria:* **Filipendula Ulmaria.**
—***Vanhouttei.**
— *venusta:* **Filipendula rubra venusta.**

SPIRANTHES. S. cernua.

SPONDIAS. *S. axillaris:* **S. lutea.**

SPREKELIA. S. formosissima (Amaryllis).

STACHYS. *S. Betonica* (Betonica): **S. officinalis.**
— **grandiflora** (Betonica).
— **lanata.**
— **Sieboldii.**

STAPHYLEA. *S. Bumalda.
—***colchica.**
—***pinnata.**
—***trifolia.**

STATICE (see Armeria). *S. arborescens:* **Limonium arborescens.**
— *Bonduellii:* **L. Bonduellii.**
— *Gmelinii:* **L. Gmelinii.**
— *incana:* **L. tataricum angustifolium.**
— *latifolia:* **L. latifolium.**
— *sinuata:* **L. sinuatum.**
— *Suworowii:* **L. Suworowii.**
— *tatarica:* **L. tataricum.**

STEIRONEMA. S. ciliatum (Lysimachia).

STELLARIA. S. Holostea.

STENACTIS. *S. speciosa:* **Erigeron speciosus.**

STENANTHIUM. S. robustum.

STENOTAPHRUM. *S. glabrum:* **S. secundatum.**

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STEPHANANDRA. **S. flexuosa:* **S. incisa.**
STEPHANOPHYSUM. *S. longifolium:* **Ruellia amœna.**
STEPHANOTIS. ***S. floribunda.**
STERCULIA. ***S. acerifolia.**
—***diversifolia.**
—***platanifolia.**
STERNBERGIA. **S. lutea** (Amaryllis).
STEVENSONIA. *S. grandiflora:* **S. grandifolia.**
STEVIA. *S. serrata* of florists: **Piqueria trinervia.**
STEWARTIA (Stuartia). ***S. pentagyna.**
—***Pseudo-Camellia.**
STIGMAPHYLLON. **S. ciliatum.**
STIPA. **S. elegantissima.**
— **pennata.**
STIZOLOBIUM. **S. Deeringianum** (Velvet Bean).
— **pruriens** (Mucuna).
STOKESIA. *S. cyanea:* **S. lævis.**
STRELITZIA. **S. Reginæ.**
STREPTOPUS. **S. roseus.**
STREPTOSOLEN. **S. Jamesonii** (Browallia).
STROBILANTHES. **S. Dyerianus.**
STUARTIA. *S. plantaginea:* ***Stewartia pentagyna.**
— *Pseudo-Camellia:* ***Stewartia Pseudo-Camellia.**
STYLOMA. See Pritchardia.
STYLOPHORUM. **S. diphyllum.**
STYRAX. ***S. americana.**
—***japonica.**
—***Obassia.**
SUTHERLANDIA. ***S. frutescens.**
SWAINSONA. **S. galegifolia.**
— *grandiflora:* **S. Greyana,** perhaps applied also to forms of S. galegifolia.
— **Greyana.**
SYMPHORICARPOS. ***S. occidentalis.**
—***oreophilus.**
—******pauciflorus:* **S. albus pauciflorus,** but the plant in cultivation is usually **S. albus.**
—******racemosus:* **S. albus,** but the plant in cultivation is usually **S. albus lævigatus.**
—******vulgaris:* **S. orbiculatus.**
SYMPHYTUM. *S. asperrimum:* **S. asperum.**
— **officinale.**
SYMPLOCARPUS (Spathyema in the American Code). **S. fœtidus.**
SYNDESMON. See Anemonella.
SYRINGA. *S. alba:* **S. vulgaris alba.**
— *cærulea:* **S. vulgaris cærulea.**
—***chinensis.**
—***japonica.**
—***Josikæa.**
—***pekinensis.**
—***persica.**
—***pubescens.**
—******rothomagensis:* **S. chinensis.**

SYRINGA, continued.
—***villosa.**
—***vulgaris.**
—***Wilsonii.**
SYZYGIUM (see Eugenia). ***S. operculatum.**

TACSONIA. *T. manicata:* **Passiflora manicata.**
— *mollissima:* **P. mollissima.**
TAGETES. **T. erecta.**
— **lucida.**
— **patula.**
— **signata.**
TAMARINDUS. ***T. indica.**
TAMARIX. *T. æstivalis:* ***T. pentandra.**
—***africana;** but stock usually **T. gallica** or **T. parviflora.**
— *algerica:* not known botanically; possibly a form of T. gallica.
— *amurensis:* a form of **T. pentandra.**
—***chinensis.**
—***gallica.**
— *germanica:* **Myricaria germanica.**
—***hispida.**
— *indica:* ***T. gallica indica.**
— *japonica:* ***T. juniperina.**
—***juniperina.**
—***odessana.**
—***parviflora.**
— **pentandra.**
— *plumosa:* ***T. juniperina.**
—***tetrandra.**
TANACETUM. **T. vulgare.**
TARAXACUM. **T. officinale** (Dandelion).
TAXODIUM. ***T. distichum.**
—***mucronatum.**
TAXUS. ***T. baccata.**
—***canadensis.**
—***cuspidata.**
— *hibernica:* ***T. baccata fastigiata.**
— *koraiensis:* probably ***Cephalotaxus Harringtonia fastigiata.**
— *minor:* ***T. canadensis.**
— *procumbens:* ***T. baccata procumbens.**
— *repanda:* ***T. baccata repandens.**
— *repandens:* ***T. baccata repandens.**
— *tardiva:* ***T. baccata adpressa.**
TECOMA. *T. australis:* ***Pandorea australis.**
— *capensis:* ***Tecomaria capensis.**
— *capreolata:* ***Bignonia capreolata.**
— *grandiflora:* **Campsis chinensis: *Bignonia grandiflora.**
— *jasminoides:* ***Pandorea jasminoides.**
— *Mackenii:* ***Pandorea Ricasoliana.**
— *radicans:* **Campsis radicans: *Bignonia radicans.**
— *Ricasoliana:* ***Pandorea Ricasoliana.**
—***Smithii.**
—***stans.**
TECOMARIA. ***T. capensis** (Tecoma).
TELANTHERA (Alternanthera). **T. amœna rosea.**
— **Bettzickiana.**
— **versicolor.**
TELEKIA. *T. cordifolia:* **Buphthalmum speciosum.**

TEMPLETONIA. ***T. retusa.**
TERMINALIA. **T. Catappa.**
TETRAGONIA. **T. expansa** (New Zealand Spinach).
TETRAPANAX. ***T. papyriferum** (Aralia. Fatsia).
TEUCRIUM. **T. canadense.**
—***Chamædrys.**
THALIA. **T. dealbata.**
THALICTRUM. *T. adiantifolium:* **T. minus adiantifolium.**
— *anemonoides:* **Anemonella thalictroides** (page 3296, under Syndesmon).
— **aquilegifolium.**
— *Cornuti:* either **T. aquilegifolium** or **T. polygamum.**
— **dasycarpum.**
— **dioicum.**
— **dipterocarpum.**
— **glaucum.**
— **minus.**
— **paniculatum.**
— **polygamum.**
THEA. *T. Bohea:* ***T. sinensis Bohea** (Camellia).
—***sinensis.**
THELESPERMA. **T. hybridum** (Cosmidium).
THEOBROMA. **T. Cacao.**
THERMOPSIS. **T. caroliniana.**
THESPESIA. **T. populnea.**
THEVETIA. **T. nereifolia.**
THRINAX. **T. Morrisii.**
— **parviflora.**
THUJA (Thuya. See Biota). *T. elegantissima:* ***T. orientalis elegantissima;** perhaps also **T. occidentalis lutea.**
— *Ellwangeriana:* ***T. occidentalis Ellwangeriana.**
— *ericoides:* ***T. occidentalis ericoides.**
— *filiformis:* ***T. orientalis pendula;** the stock is perhaps sometimes ***T. occidentalis filiformis.**
— *gigantea:* ***T. plicata.**
— *globosa:* ***T. occidentalis globosa.**
— *japonica:* ***T. Standishii.**
— *Lobbii:* ***T. plicata.**
—***occidentalis.**
—***orientalis.**
—***plicata.**
— *pumila:* ***T. occidentalis pumila.**
— *pyramidalis:* applied both to ***T. occidentalis pyramidalis** and to ***T. orientalis pyramidalis.**
— *Reidii:* ***T. occidentalis Reidii.**
— *sibirica:* ***T. occidentalis Wareana.**
—***Standishii** (Thujopsis).
— *Vervæneana:* ***T. occidentalis Vervæneana.**
— *Wareana:* ***T. occidentalis Wareana.**
THUJOPSIS. *T. borealis:* ***Chamæcyparis nootkatensis.**
—***dolobrata.**
— *Standishii:* ***Thuja Standishii.**
THUNBERGIA. ***T. alata.**
—***coccinea.**
—***fragrans.**
—***grandiflora.**
— *Harrisii:* ***T. laurifolia.**

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THYMUS. *T. citriodorus:* T. Serpyllum vulgaris.
— *coccineus:* T. Serpyllum coccineus.
— *lanuginosus:* T. Serpyllum lanuginosus.
— Serpyllum.
— vulgaris.
THYRSACANTHUS. *T. rutilans:* Odontonema Schomburgkianum.
TIARELLA. T. cordifolia.
— *purpurea:* T. cordifolia purpurea.
TIBOUCHINA. T. semidecandra (Lasiandra macrantha).
TIGRIDIA. *T. canariensis:* T. Pavonia canariensis.
— *conchiflora:* T. Pavonia conchiflora.
— *grandiflora:* T. Pavonia grandiflora.
— *immaculata:* T. Pavonia alba immaculata or lutea immaculata.
— *lilacea:* T. Pavonia lilacea.
— Pavonia.
— *rosea:* T. Pavonia rosea.
TILIA. *T. alba:* a confused name applying to forms of T. tomentosa, T. petiolaris, and T. neglecta.
—*americana.
— *argentea:* *T. tomentosa.
— *asplenifolia:* *T. platyphyllos laciniata.
—*cordata.
— *dasystyla:* *T. euchlora.
—*euchlora.
— *europæa:* *T. vulgaris; sometimes misapplied to T. platyphyllos and T. cordata.
—*heterophylla.
— *macrophylla:* *T. americana macrophylla.
— *mississippiensis:* *T. americana macrophylla.
—*petiolaris.
—*platyphyllos.
—*tomentosa.
— *ulmifolia:* *T. cordata.
—*vulgaris.
TILLANDSIA. T. usneoides (Spanish Moss).
TIPUANA. T. speciosa.
TORENIA. *T. Baillonii:* T. flava.
— Fournieri.
TORREYA (Tumion under American Code). *T. californica.
—*nucifera.
TOXYLON. See Maclura.
TRACHELIUM. T. cæruleum.
TRACHELOSPERMUM. T. jasminoides (Rhynchospermum).
TRACHYCARPUS. *T. excelsa (Chamærops).
—*Fortunei (Chamærops).
—*Martiana.
TRACHYMENE. T. cærulea (Didiscus).
TRADESCANTIA. *T. multicolor:* Zebrina pendula quadricolor.
— *repens:* T. fluminensis.
— *virginica:* T. virginiana.
— *vulgaris:* unknown botanically.
— *zebrina:* Zebrina pendula.
TRAGOPOGON. T. porrifolius (Salsify).
TRAPA. T. natans.
TRICHOLÆNA. T. rosea.
TRICHOSANTHES. *T. colubrina:* T. Anguina.
TRICYRTIS. T. macropoda.
— hirta.
TRIFOLIUM. T. hybridum (Alsike Clover).
— incarnatum (Crimson Clover).
— medium (Mammoth Clover).
— *minus:* a form of T. repens (White Clover).
— pratense (Common Red Clover).
— *suaveolens:* T. resupinatum.
TRILLIUM. T. cernuum.
— erectum.
— *erythrocarpum:* T. undulatum.
— grandiflorum.
— nivale.
— ovatum.
— petiolatum.
— recurvatum.
— sessile.
— stylosum.
— undulatum.
TRISTANIA. T. conferta.
TRITICUM. T. æstivum (Wheat).
TRITOMA. T. corallina.
— *hybrida:* Kniphofia hybrida, a collective trade name.
— *Macowanii:* K. Macowanii.
— *nobilis:* K. Uvaria nobilis.
— *Pfitzeri:* K. Uvaria grandis.
— *Quartiniana:* K. foliosa.
— *Saundersii:* K. Uvaria Saundersii.
— *sulphurea:* K. sulphurea.
— *tricolor:* K. tricolor.
— *Uvaria:* K. Uvaria.
TRITONIA (Montbretia). T. aurantiaca.
— crocosmæflora.
— Pottsii.
— rosea.
TROLLIUS. T. asiaticus.
— caucasicus.
— chinensis.
— europæus.
— japonicus.
— Ledebouri.
— pumilus.
TROPÆOLUM. *T. atropurpureum:* probably a color form of T. peltophorum, of T. majus, or of T. majus nanum.
— *canariense:* T. peregrinum.
— *Heinemannii:* a color form of T. majus.
— *hemisphericum:* a color form of T. majus.
— *Lobbianum:* T. peltophorum.
— *luteum:* a color form of T. minus or of T. majus.
— majus.
— minus.
— *nanum:* T. majus nanum.
— pentaphyllum.
— peregrinum.
— *Regelianum:* a color form of T. majus or of T. majus nanum.
— speciosum.
— tricolor.
TSUGA. *T. canadensis.
—*caroliniana.
—*diversifolia.
— *Fretzii:* Pseudotsuga taxifolia Fretzii: *P. Douglasii Fretzii.
—*heterophylla.
— *Hookeriana:* *T. Mertensiana.
—*Mertensiana; but sometimes misapplied to T. heterophylla.
—*Sieboldii.
TULIPA. T. Gesneriana.
— suaveolens.
TUMION. See Torreya.
TUNICA (Petrorhagia under American Code). T. Saxifraga.
TUSSILAGO. T. Farfara.
TYPHA. T. latifolia.

ULEX. *U. europæus.
ULMARIA. *U. Filipendula:* Filipendula hexapetala.
— *palmata:* F. palmata.
— *purpurea:* F. purpurea.
— *rubra:* F. rubra.
— *venusta:* F. rubra venusta.
ULMUS. *U. alata.
—*americana.
— *Camperdownii:* *U. glabra Camperdownii.
—*campestris (English Elm); often misapplied to U. foliacea.
— *Clemmeri:* *U. hollandica Klemmer.
—*foliacea.
—*fulva.
—*glabra (Scotch Elm).
—*hollandica.
— *horizontalis:* *U. glabra pendula.
— *Huntingdonii:* *U. hollandica vegeta (Huntingdon Elm).
— *latifolia:* *U. hollandica belgica.
— *montana:* *U. glabra.
— *plumosa:* *U. glabra fastigiata.
—*pumila.
— *purpurea:* *U. campestris purpurea.
—*racemosa.
— *scabra:* *U. glabra.
— *suberosa:* either U. campestris or U. foliacea suberosa.
— *umbraculifera:* *U. foliacea umbraculifera.
— *vegeta:* *U. hollandica vegeta.
— *Wentworthii:* *U. campestris Wentworthii.
UMBELLULARIA. *U. californica.
UNIOLA. U. latifolia.
URGINEA. U. Scilla (Scilla maritima).
URSINIA. U. pulchra (Sphenogyne).
UVULARIA. U. grandiflora.
— perfoliata.
— *sessilifolia:* Oakesia sessilifolia.

VACCINIUM. *V. corymbosum.
—*erythrocarpum.
—*macrocarpon.
—*pallidum.
—*pennsylvanicum.
—*stamineum.
—*vacillans.
—*Vitis-Idæa.

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VALERIANA. *V. alba:* probably a white form of **Centranthus ruber**, but perhaps **V. officinalis alba.**
— *coccinea:* unknown botanically.
— **officinalis.**
— *rubra:* **Centranthus ruber.**
VALERIANELLA. **V. olitoria** (Corn Salad).
VALLISNERIA. **V. spiralis.**
VALLOTA. **V. purpurea.**
VENIDIUM. *V. calendulaceum:* **V. decurrens calendulaceum.**
VERATRUM. **V. viride.**
VERBASCUM. **V. nigrum.**
— **olympicum.**
— *pannosum:* **V. longifolium pannosum.**
— **phœniceum.**
VERBENA. *V. Aubletia:* **V. canadensis.**
— *citriodora:* **Lippia citriodora.**
— **erinoides.**
— **hybrida.**
— *montana:* either **V. bipinnatifida** or **V. canadensis.**
— **teucrioides.**
— **venosa.**
There are other Latin names in Verbena, designating garden forms.
VERNONIA. *V. arkansana:* **V. crinita.**
— **noveboracensis.**
VERONICA. ***V. Allionii.**
—***alpina.**
— *amethystina:* ***V. spuria.**
—***Andersonii.**
—***carnea;** but may apply to a form of **V. spuria.**
— *decussata:* ***V. elliptica.**
—***elliptica.**
—***gentianoides.**
—***imperialis.**
—***incana.**
— **longifolia.**
—**maritima:* ***V. longifolia.**
— **pectinata.**
—***repens.**
—**rosea:* **V. longifolia rosea, V. spicata rosea** or **V. pectinat rosea.**
—**rupestris;* a form of **V. Teucrium.**
—***speciosa.**
—***spicata.**
— **spuria.**
— *subsessilis:* ***V. longifolia subsessilis.**
—***Teucrium.**
—***Traversii.**
—***verbenacea:** unknown botanically.
—***virginica.**
VERSCHAFFELTIA. **V. splendida.**
VIBURNUM. ***V. acerifolium.**
—***alnifolium.**
—***americanum** (American High-bush Cranberry).
—***Carlesii.**
—***cassinoides.**
—***dentatum.**
—***dilatatum.**
—***ellipticum.**
—***japonicum.**

VIBURNUM, continued.
—***Lantana.**
— *lantanoides:* ***V. alnifolium.**
—***Lentago.**
—***macrocephalum.**
— *macrophyllum:* ***V. japonicum.**
—***molle;** often misapplied to **V. venosum** and **V. venosum Canbyi.**
—***nudum.**
—***odoratissimum.**
—***Opulus** (European High-bush Cranberry).
— *Oxycoccus:* ***V. americanum,** but sometimes misapplied to **V. Opulus.**
— *plicatum:* **V. tomentosum plenum:** ***V. tomentosum plicatum.**
—***prunifolium.**
—***pubescens.**
— *pyrifolium:* ***V. prunifolium.**
—***rhytidophyllum.**
—***rufidulum.**
— *Sandankwa:* ***V. suspensum.**
—***Sieboldii.**
— *sterile:* may be **V. macrocephalum sterile** or **V. Opulus sterile.**
—***suspensum.**
—***Tinus.**
—***tomentosum.**
—***utile.**
—***venosum.**
—***Wrightii.**
VICIA. **V. Faba** (Broad or Windsor Bean).
— *Gerardii:* **V. cracca Gerardii.**
— **oroboides** (Orobus lathyroides).
— **sativa** (Spring Vetch).
— **villosa** (Hairy Vetch).
VICTORIA. **V. regia.**
— *Trickeri:* **V. Cruziana.**
VIGNA. **V. Catjang.**
— **sesquipedalis** (Asparagus Bean).
— **sinensis** (Cowpea).
VINCA. *V. alba:* ***V. minor alba.**
— *argentea:* ***V. minor argentea.**
— *aurea:* ***V. minor aurea.**
— *cærulea:* ***V. minor cærulea.**
— *elegantissima:* applied either to **V. major elegantissima** or a form of **V. minor.**
— **herbacea.**
—***major.**
—***minor.**
— *purpurea:* ***V. minor purpurea.**
—***rosea.**
VINCETOXICUM. *V. acuminatum:* **Cynanchum acuminatifolium.**
— *japonicum:* **C. acuminatifolium.**
IOLA. *V. admirabilis:* **V. cornuta admirabilis.**
— **blanda.**
— *californica:* **V. odorata.**
— *canina:* probably **V. conspersa;** V. canina is a European species and not now recognized as occurring natively in any form in North America.
— **cornuta.**
— **cucullata;** the stock in trade, however, is probably **V. palmata.**
— **lutea.**
— **odorata.**
— **palmata.**

VIOLA, continued.
— *Papilio:* **V. cornuta Papilio.**
— **pedata.**
— **pedunculata.**
— **Priceana.**
— **pubescens.**
— **rotundifolia.**
— **septentrionalis.**
— **tricolor.**
VIRGILIA: *V. lutea:* ***Cladrastis lutea.**
VISCARIA. *V. elegans:* **Lychnis Viscaria elegans.**
— *oculata:* **L. Coeli-rosea oculata.**
VITEX. ***V. Agnus-castus.**
— *incisa:* ***V. Negundo incisa.**
—***Negundo.**
VITIS (see Ampelopsis, Cissus, Parthenocissus). *V. aconitifolia:* ***Ampelopsis aconitifolia.**
—***æstivalis.**
—***amurensis.**
—***Berlandieri.**
—***bicolor.**
— *Bourquiniana:* ***V. æstivalis Bourquiniana.**
— *brevipedunculata:* ***A. heterophylla amurensis.**
—***californica.**
—***candicans.**
— *capensis:* ***Cissus capensis** (page 3482).
—***Champinii.**
—***cinerea.**
—***Coignetiæ.**
— *cordata:* ***A. cordata.**
—***cordifolia.**
— *discolor:* ***C. discolor.**
—***Doaniana.**
—***Girdiana.**
— *Henryana:* **Parthenocissus Henryana:** ***A. Henryana.**
— *heterophylla:* ***A. heterophylla.**
— *humulifolia:* ***A. humulifolia.**
— *hypoglauca:* ***A. hypoglauca** (page 3483).
—***Labrusca.**
—***Linsecomii.**
—***Longii.**
— *megalophylla:* ***A. megalophylla.**
— *oblonga:* ***C. oblonga** (page 3483).
— *quadrangularis:* ***C. quadrangularis** (page 3482).
— *rhombifolia:* ***C. rhombifolia** (page 3483).
— *riparia:* ***V. vulpina.**
—***rotundifolia.**
—***rubra.**
—***rupestris.**
— *striata:* ***C. striata.**
— *Thomsonii:* **P. Thomsonii:** ***A. Thomsonii.**
—***vinifera.**
—***vulpina.**
VITTADINIA. **V. triloba** (Erigeron mucronatus).
VOLUTARELLA. **V. muricata** (Amberboa).

WAHLENBERGIA. *W. grandiflora:* **Platycodon grandiflorum.**
— *vincæflora:* **W. gracilis.**
WALDSTEINIA. **W. fragarioides.**
WASHINGTONIA. **W. filifera** (Brahea).

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WASHINGTONIA, continued.
— **gracilis.**
— *robusta:* **W. filifera robusta** (Brahea).
— **Sonoræ.**

WATSONIA. *W. Ardernei:* **W. viridifolia O'Brienii.**

WEIGELA (if the American and East Asian species are considered to be con-generic, the name becomes Diervilla, and this is the usual disposition; the name Weigela, however, is well established in horticultural practice).
—**amabilis:* **Diervilla florida**, or perhaps sometimes **D. coræensis.**
—**arborea:* **D. coræensis arborea.**
—**candida:* **D. hybrida candida.**
—**Desboisii:* **D. hybrida Desboisii.**
— *florida:* **D. florida:** *W. rosea.
—**floribunda:* **D. floribunda.**
—**Grœnewegenii:* **D. hybrida Grœnewegenii.**
—**Hendersonii:* **D. hybrida Hendersonii.**
—**hortensis:* **D. japonica hortensis.**
—**hybrida:* **D. hybrida.**
—**japonica:* **D. japonica.**
—**Kosteriana:* **D. hybrida Kosteriana variegata.**
—*Lavallei: **D. hybrida Lavallei.**
—**nana:* **D. hybrida nana variegata.**
—**rosea:* **D. florida.**
— *sessilifolia:* ***D. sessilifolia.**
—**Steltzneri:* **D. hybrida Steltzneri.**
—**Van Houttei:* **D. hybrida Van Houttei.**
—**venosa:* **D. hybrida venosa.**
—**Verschaffeltii:* **D. hybrida Verschaffeltii.**

WELLINGTONIA. *W. gigantea:* ***Sequoia gigantea.**

WHITLAVIA. *W. gloxinioides:* **Phacelia Whitlavia gloxinioides.**
— *grandiflora:* **P. Whitlavia.**

WIGANDIA. W. caracasana.
— **imperialis.**
— *macrophylla:* **W. caracasana macrophylla.**
— **Vigieri.**

WISTERIA. *W. brachybotrys:* ***W. floribunda.**
— *brachybotrys alba:* ***W. venusta.**
— *chinensis:* ***W. sinensis.**
— **floribunda.**
—***frutescens.**
— *magnifica:* ***W. frutescens magnifica.**
—**multijuga:* **W. floribunda macrobotrys.**
—***sinensis**; but often it is **W. floribunda.**
— *speciosa:* ***W. frutescens.**
—***venusta.**

WOODSIA. W. ilvensis.
— **obtusa.**

WOODWARDIA. *W. angustifolia:* **W. areolata.**
virginica.

XANTHISMA. X. texanum (Centauridium).

XANTHOCERAS. *X. sorbifolia.

XANTHORRHIZA. *X. apiifolia:* ***Zanthorhiza apiifolia.**

XANTHOSOMA. X. Lindenii (Phyllotænium).

XANTHOXYLUM. See Zanthoxylum.

XERANTHEMUM. X. annuum.

XOLISMA. *X. ligustrina:* ***Lyonia ligustrina.**

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Asteracantha longifolia, 73×.
Asteriscus pygmæus, 2820×.
Asterostigma Luschnathianum, 3233×.
Astragalus gummifer, 42; tennesseensis, 1471×.
Astrapæa tiliæfolia, 1065×; Wallichii, 1066.
Astrophytum myriostigma, 1092×.
Asystasia gangetica, 73×.
Ataccia cristata, 3304×.
Atalantia buxifolia, 3158×; glauca, 1127×; Hindsii, 1270; missionis, 2446×.
Atamasco Lily, 3542.
Atamosco, 3541×.
Athamanta Meum, 2045×.
Athanasia annua, 1903×.
Athenian Poplar, 2757×.
Atherosperma moschatum, 35.
Athyrium Goringianum var. pictum, 415×.
Atis, 294×.
Atragene alpina, 792; americana, 792; sibirica, 792×.
Atrageneæ (Clematis), 792.
Atriplex hortensis, 29.
Atropa Belladonna, 70×; Mandragora, 1982×; physalodes, 2140.
Atta, 294×.
Attalea, 2445; amygdalina, 2016; Cohune, 2300×; funifera, 2300×; Maripa, 2016.
Atte, 294×.
Atuketiya, 3527×.
Aubergine, 1101×, 3182×.
Aucuparia (Sorbus), 3195.
Aulizeum, 1118.
Auricula lutea, 2787×.
Australes (Pinus), 2642×.
Australian Beech, 1152×; Bluebell Creeper, 3189; Brush Cherry, 1163; Daisy-Bush, 2334; Desert Kumquat, 1127×; Gray Box, 1153×; Pea, 1065; Rye-Grass, 1902×; Sword Lily, 260; Violet, 3473.
Austrian Briar, 2995×; Briar, Copper, 2995×; Pine, 2641.
Autumn Aconite, 210×; Adonis, 221; Crocus, 824×; Snowflake, 1849; Squill, 3117×.
Ava, 24, 2646×.
Avena flavescens, 3384.
Averrhoa acida, 2606×.
Avery, Robert, 1564.
Avocat, 2556.
Avocato, 2556.
Awnless Brome-Grass, 578×.
Axillifloræ (Saxifraga), 3089.
Ayer Ayer, 1818×.
Ayrshire Rose, 2987.
Azadirachta indica, 2025.
Azalea alba, 2943×; albiflora, 2941; Albrechtii, 2944×; amœna, 1439×, 2944×; arborescens, 2942; aurantiaca, 2942; austrina, 3571; balsaminæflora, 2944; calendulacea, 2942; californica, 2941×; calyciflora, 2944×; canadensis, 2943; candida, 2945; canescens, 2942; Championæ, 2945; crispiflora, 2944; dahurica, 2938×; Danielsiana, 2944; dilatata, 2945×; Eeckhautei, 2945×; Farreræ, 2945×; Flame-colored, 2942; gandavensis, 2942×; hispida, 2942; indica, 2944; indica var. alba, 2944; indica var. calycina, 2944; indica var. lateritia, 2944; japonica, 2942×; japonica alba grandiflora Van Noordt, 2944; kamtschatica, 2946×; ledifolia, 2943×; ledifolia Noordtiana, 2944; ledifolia var. phœnicea, 2944; liliiflora, 2943×; linearifolia, 2946×; lutea, 2942; macrantha, 2944; macrosepala, 2946×; mollis, 2942×; Mortieriana, 2942×; myrtifolia, 2947; narcissiflora, 2944; nudiflora, 2942; obtusa, 2944×; obtusa alba, 2944×; occidentalis, 2941×; ovata, 2947; pontica, 2942×; procumbens, 1902; punicea, 2944; rhombica, 2943×; Rollissonii, 2944; rosiflora, 2944; rosmarinifolia, 2943×; Schlippenbachii, 2943×; semibarbata, 2947×; serpyllifolia, 2947×; sinensis, 2942×; Smooth, 2942; speciosa, 2942; squamata, 2945×; sublanceolata, 2947×; Tschonoskii, 2947×; Vaseyi, 2943; viscosa, 2942; yodogawa, 2943×.

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Azaleastrum albiflorum, 2941.
Azaleodendron, 2941.

Babci, 232×.
Babies' Breath, 283×; Slippers, 1917×.
Baby Blue-Eyes, 2121; Orchid, 2322×; Primrose, 2796.
Baby's Breath, 1312, 1422×.
Bachang, 1984×.
Bachelor's Button, 711, 1355; White, 2907×; Yellow, 2909.
Bacopa Monnieria, 1477×.
Bacteria, 4.
Bactris, 2445.
Badiera acuminata, 2739.
Bael Fruit, 222×.
Baeria coronaria, 213×.
Baguilumbang, 245×.
Bahia lanata, 1135.
Bairnwort, 486.
Bakeapple-Berry, 3023×.
Balantium, 1209×.
Bald Cypress, 3314×.
Balfourianæ (Pinus), 2639×.
Balisier, 1451.
Balloon Flower, 2711; -Vine, 661×.
Balm, 911, 2027; Bee-, 2061; Field, 2130×; Fragrant, 2061; Molucca, 2059×; of Gilead, 2763; of Gilead Fir, 173×.
Balocanad, 245×.
Balsa, 2319.
Balsam, 1418; -Apple, 2060; -Apple, Wild, 1096; Canada, 12×; Canadian, 174; Family, 50×; Fir, 173×; Garden, 997, 1642×; Mecca, 45×; Night, 3532×; of Copaiba, 42; of Fir, 174; of Tolu, 42; Pear, 2060; Peru, 1418; Poplar, 2762×; Seaside, 902; She, 174; Star, 3532×.
Balsamea, 3538×.
Balsamina coccinea, 1642×; hortensis, 1642×.
Balsaminaceæ, 50×.
Balsamita vulgaris, 757.
Balucanag, 245×.
Bamboo Brier, 3174; Giant, 3342×; Palm, 2910×.
Banana, Abyssinian, 2077; Baracoa, 2078×; Chinese Dwarf, 2078; Chotda, 2078×; Cooking, 2078×; Dwarf Jamaica, 2078; Family, 21×; Golden Early, 2078×; Japanese, 2078×; Lady Finger, 2078×; Letondal, 2078×; Red Jamaica, 2078×; Red Spanish, 2078×; Shrub, 2046.
Bancroft, George, 1564.
Bandura Zingalensium, 2124.
Baneberry, 212; Red, 212×.
Banksianæ (Rosa), 2988×.
Banks' Rose, 2988×.
Bankul Oil, 245.
Banucalag, 245×.
Banyan Tree, 1233×.
Baobab Tree, 214×.
Baptisia nepalensis, 2647.
Baracoa Banana, 2078×.
Barbacenia gracilis, 966.
Barbadine, 2481×.
Barbadoes Aloes, 255×; Gooseberry, 2547.
Barbados Cherry, 1973; Flower-Fence, 613; Lily, 1493; Nut, 1720; Pride, 613.
Barberry Family, 33; Fig, 2363.
Barilla, 3050.
Barkeria elegans, 1118×; Lindleyana, 1118×; Skinneri, 1118×; spectabilis, 1118×.
Bark, Georgia, 2626×.
Barley, 1500; -Grass, 1500.
Barnardia japonica, 3118×; scilloides, 3117×.
Barrel Gentian, 1326×; Palm, 2810.
Barren Strawberry, 3486; -wort, 205×.
Barry, Patrick, 1564; W. C., 3554.
Bartonia aurea, 2037, 3582; decapetala, 2037.
Bartram, John, 1564×.
Barwood, 453.
Baryxylum dubium, 2536×; inerme, 2536×.
Basella alba, 31; Family, 30×; variegata, 3306×.
Basellaceæ, 30×.
Basidiomycetes, 5×, 2087×.
Basil, 911×, 2863.
Basilima Lindleyana, 3193×; sorbifolia, 3193×.
Basket Flower, 712×, 1627×; Oak, 2886×.
Bassia latifolia, 2300×.
Basswood, 3345×; Family, 52.
Bastard Box Tree, 1155; Indigo, 275×; Pennyroyal, 3377; Sandalwood, 2090×; Speedwell, 3449×.
Batatas edulis, 1662; Jalapa, 1662.
Batemannia, 2401×; Burtii, 1615; meleagris, 1615.
Batidæa, 3021.
Batodendron (Vaccinium), 3422.
Batoko Plum, 1241.
Batrachium hederaceum, 2906×.
Bauno, 1985.
Bayberry, 2093, 2626.
Bay, Bull, 1968, 2556; -Leaf Willow, 3052; Red, 2556; Rose, 2139; -rum Tree, 2626; Swamp, 1967×; Sweet, 1827, 1967×; White, 1967×.
Beach Aster, 1133; -Grass, 274×; Heather, 1613; Palm, 441; Pea, 1826; Plum, 2831; Wormwood, 399×.
Beadle, D. W., 1565.
Bead-Plant, 2139×; -Tree, 1107, 2024×.
Beam-Tree, White, 3197.
Bean, Adzuki, 2575×; Asparagus, 3469×; Broad, 3464×; -Caper, Syrian, 3551×; Castor, 2965×; Civet, 2577; Coffee, 1352; Common, 2576×; Dutch Case-Knife, 2576; English Dwarf, 3464×; Goa, 2849; Horse, 3464×; Hyacinth, 1065; Indian 684×; Jumping, 829; Kidney, 2576×; Lima, 2577; Magothy Bay, 680×; Metcalf, 2575; Mexican Jumping, 3124; Moth, 2575; Mung, 2575×; Rice, 2575×; Scarlet Runner, 2576; Screw, 2811; Sieva, 2577; Soja, 1352; Soy, 1352; -Tree, 1763; Vanilla, 3434; Velvet, 3243; Wild, 310×; Windsor, 3464×; Yam, 2425×.
Bearberry, 385×; Blueberry, 3424; Oak, 2884×.
Beard-Grass, 282; -Grass, Silver, 282×; -Tongue, 2539.
Bear's Breech, 194×; -ear Primrose, 2794; -foot Fern, 1614.
Beatonia, 3345.
Beaucarnea glauca, 2147×; gracilis, 2147×; guatemalensis, 2147×; Hookeri, 2148; longifolia, 2147×; oedipus, 2147×; Purpusi, 2147×; recurvata, 2147×; recurvata stricta, 2147×; stricta, 2147×; tuberculata, 2147×.
Beauty of Glasenwood, 2987×.
Beaver Tree, 1967×.
Bebeeru Wood, 35×.
Beccabunga (Veronica), 3451×.
Bedding Geranium, 2531; Pansy, 3474.
Bedstraw, 1311×; Great Hedge, 1312; Ladies', 1311×; Northern, 1311×; White, 1312; Yellow, 1311×.
Bee-Balm, 442×, 2061; Larkspur, 977; Orchis, 2356; -Plant, Rocky Mountain, 799.
Beech, American, 1202×; Australian, 1152×; Blue, 673; European, 1202×; Family, 25×; -drop, 1824×; Fern, 2577×.
Beefsteak Geranium, 469.
Beefwood, 683×.
Beet, Chilian, 496×; -Leaf, 496×; Sea-Kale, 496×; Sicilian, 496×; Spinach, 496×.
Beethovenia cerifera, 726.
Beetle-weed, 1310.
Beet-root, 269×, 496.
Beggarweed, Florida, 991.
Begonia Family, 57×; Trailing, 776×.
Begoniaceæ, 57×.
Belleric Myrobalan, 3322.
Belgaum Walnut, 245×.
Belgian Elm, 3412.
Belladonna, 70×, 428; Lily, 271.
Bella sombra, 2614×.
Bellflower, 642; Chilean, 1820; Chinese, 176×, 2711; Family, 76; Giant, 2414×; Japanese, 2711.
Bell-flowered Squill, 3117×; Heather, 1130×; Isle Cress, 454; -wort, 3419×.
Bellyache Bush, 1719×.
Belou Marmelos, 222×.
Belvedere, 1755×.
Ben, 2067×.
Bencaode Deos, 178×.
Bene, 3157.
Bengal Coffee, 823×; Kino, 601; Rose, 2988.
Benincasa hispida, 76.
Benjamin Bush, 487.
Benne Oil, 72, 3157.
Ben-nuts, 2068.
Bent-Grass, Brown, 241; Fine, 240×; Purple, 617.
Benthamia fragifera, 855; japonica, 854×.
Benthamidia, 854×.
Berberidaceæ, 33.
Berberine, 33.
Berberis aggregata, 3566; amurensis var. japonica, 3566; Aquifolium, 1970×; Aquifolium var. fascicularis, 1970×; arguta, 1971; atrocarpa, 3566; Bealii, 1971; brevipaniculata, 3566; brevipes, 1971; Fortunei, 1971; Fremontii, 1971; gracilis, 1971; hæmatocarpa, 1971; heterophylla, 1971; Hookeri, 3566; Hutchinsonii, 1971; japonica, 1971; Julianæ, 3566; Knightii, 3566; levis, 3566; macrophylla, 3566; nana, 1970×; nepalensis, 1971; nervosa, 1971; pallida, 1971; pinnata, 1970×; pumila, 1971; Regeliana, 3566; repens, 1970×; rotundifolia Herveyi, 1970×; Sargentiana, 3566, 3582; tenuifolia, 1971; Thunbergii, 1439×; toluacensis, 1971; trifoliata, 1971; trifoliolata, 1971×; trifurca, 1971; vulgaris, 33, 1439×; Wallichiana, 3566, 3582; Wallichiana var. latifolia, 3566; Wilcoxii, 1971×; xanthoxylon, 3566.
Berckmans, P. J., 1565.
Bergamot, 784×; Mint, 2035; Wild, 2061.
Bergenia ciliata, 3086×; cordifolia, 3086; crassifolia, 3086; Fortunei, 3093×; ligulata, 3086; Mileaii, 3086×; orbicularis, 3086; ornata, 3086×; purpurascens, 3086; Schmidtii, 3086×; Stracheyi, 3086×.
Berkheya membranifolia, 3244×; purpurea, 3244×; Radula, 3244×.
Bermuda Arrow-root, 1995; Buttercup, 2418×; Easter Lily, 1867×; -Grass, 939×.
Berrya, 494.
Berseem, 3379.
Bertholletia excelsa, 59×, 2300×.
Bertolonia guttata, 1395; Legrelleana, 1395; longifolia, 3056×; margaritacea, 1395, 3056×; primulæflora, 2062×.
Beschorneria floribunda, 1305; multiflora, 1305×.
Besleria inodora, 581×
Bessey, C. E., 3554.
Beta vulgaris, 29.
Betel, 2646×; Nut, 387×, 388.
Bethlehem Sage, 2857.
Betonica carnea, 3221; grandiflora, 3219; grandiflora robusta, 3219; grandiflora superba, 3219×; incana, 3219; nivea, 3219×; officinalis, 3219; orientalis, 3219×; rosea, 3219; rubra, 3221; spicata, 3219; spicata robusta, 3219; superba, 3219×; superba alba, 3219×.
Betony, 3219; Wood, 2524×.
Betula alba var. japonica, 3566×; albo-sinensis, 3566; albo-sinensis var. septentrionalis, 3566; Bhojpattra, 25; japonica, 3566×; japonica var. mandschuria, 3566×; japonica var. ssechuanica, 3566×; papyrifera, 25; pendula var. Tauschii, 3566×; Potaninii, 3566; utilis var. Prattii, 3566; utilis var. sinensis, 3566; Wilsonii, 3566.
Betulaceæ, 25.
Bhang, 26×.
Bichea acuminata, 2301×.
Bicuculla, 1001×.
Bidens atrosanguinea, 862; dahlioides, 862; ferulæfolia, 1474×.
Bifrenaria, 2401×.
Bigarreau Cherry, 2838.
Big-bud Hickory, 677×.
Bignay, 304.
Bignonia adenophylla, 1480×; æquinoctialis, 936; æsculifolia, 3303×; alba, 2651×; buccinatoria, 2568×; callistegioides, 806; Cherere, 2568×; chinensis, 651×; echinata, 2651×; Family, 71×; Fraseri, 1939×; jasminoides, 2452; Kerere, 2568×; leucoxyla, 3303; leuoxylon, 3303; Lindleyi, 806; pallida, 3303; Pandoræ, 2452; picta, 806; purpurea, 806; radicans, 651×; speciosa, 806; Tweediana, 1939×; venusta, 2865; Yellow, 3317.
Bignoniaceæ, 71×.
Big Shellbark-Hickory, 678; -Tree Plum, 2828; Tree, Weeping, 3154; Trees of California, 3153×.
Bikue, 3528.
Bikukulla, 1001×.
Bilberry, 3421, 3424×; Bog, 3424; Dwarf, 3424.
Bilimbi, 435×.
Billbergia bivittata, 903; Carolinæ, 388×; fasciata, 222; olens, 388×; Quesneliana, 2891×; rhodocyanea, 222; sphacelata, 1412; tinctoria, 18×; variegata, 2121×; vittata, 903.
Billion-dollar Grass, 1096.
Bilsted, 1889×.
Biltia Vaseyi, 2943.
Bimlipitam Jute, 1485.
Bindweed, 838×.
Binjai, 1984×.
Biota orientalis, 3336×.
Birch, Black, 497×; Canoe, 499; Cherry, 497×; Family, 25; -leaved Poplar, 2758; Paper, 499; Red, 497×; River, 497×; Sweet, 497×; West Indian, 600×; White, 498; Yellow, 498.
Bird Cactus, 2524×; Cherry, European, 2843; Flower, 1481; -Foot Violet, 3474×; Grape, 3484×; -lime, 27×; of Paradise, 613; -of-Paradise Flower, 3271×.
Bird's-Eye Maple, 49×; Eyes, 3452×; -foot Trefoil, 1917×; -nest Fern, 414; -nest Moss, 2920×; -nest Orchid, 2122.
Biriba, 2974×, 2976.
Birthroot, 3380×; -wort, 392×; -wort Family, 28.
Bish, 209×.
Bishop's-Cap, 2058.
Bistort, 2742.
Bistorta, 28×; officinalis, 2742.
Bitter Aloes, 255×; -Apple, 780; Cassava, 1991×; Dock, 3037; -nut, 676×; Pecan, 676×; -Root, 1851×; -sweet, 3186; -sweet, False, 701; Vetch, 3466; -wood, Smaller, 3526×.

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Bixa Family, 55×; Orellana, 55×.
Bixaceæ, 55×.
Black Alder, 253×, 1640×; Apricot, 2824×; Ash, 1276×; Bamboo, 447; Bead, 2652; Birch, 497×; Bitter Vetch, 1826×; Blood, 1937×; Box, 1103; Boys, 3522; Bryony, 3309; Caladium, 830; Calla, 402×; Cherry, Wild, 2842×; Chokeberry, 396×; Cosmos, 862; Cottonwood, 2762, 2764; Currant, American, 2959; Currant, Californian, 2959; Currant, European, 2959; Currant, Swamp, 2960×; Gum, 2316×; Haw, 3459×; Italian Poplar, 2761×; Jack, 2885; Lily, 1282; Locust, 2967; Mangrove, 436; Maple, 203; Medick, 2019×; Mint, 2035; Mulberry, 2071; Mustard, 544×; Nightshade, 3182; Oak, 2883×, 2884; Oak, Californian, 2884; Pea, 1826×; Pepper, 2646×; Pine, Japanese, 2642; Poplar, 2757×; Salsify, 3121; Sloe, 2830×; Snakeroot, 3070; Spruce, 2619×; Sumac, 2954; Walnut, 1722×; Wattle, 188; Wattle, Sydney, 188; Willow, 3052.
Blackberry, Cut-leaved, 3030×; Evergreen, 3030×; history, 1516; Lily, 485; Oregon Everbearing, 3030×; Running, 3032; Sand, 3031×; Wild Thornless, 3031×.
Blackbutt, 1155×; -cap, Common, 3028×; -eyed Pea, 3469×; -eyed Susan, 3034×, 3338×; -thorn, 2825×; -throated Calla, 3536; -wood Acacia, 185×.
Bladder Campion, 3165×; Catchfly, 3165×; Cherry, 2608×; Ketmia, 1484×; -Nut, 3227; -Nut, American, 3227×; -Nut Family, 49; Senna, 834; -wort, 3417×; -wort Family, 73.
Blade Apple, 2547.
Blandfordia cordata, 1310.
Blattaria (Verbascum), 3442×.
Blattarioides (Verbascum), 3443×.
Blazing-Star, 733, 1852×, 2037, 3385.
Blechnum, 1214.
Bleeding-Heart, 1001×.
Blehparis edulis, 73×.
Blessed Thistle, 806, 3169.
Bletia, 2401×; Tankervilliæ, 2570.
Bletilla, 2401×.
Blind Gentian, 1326×.
Blinding Tree, 1189.
Blinking Chickweed, 2065.
Blinks, 2065.
Blitum Bonus-Henricus, 737; capitatum, 737.
Blood Drops, 2017×; Lily, 1425×; -root, 3069×; -wood, 1152; -wood, Mountain, 1152×.
Bloomless Apple, 2871.
Blue Aloe, 233; Amaryllis, 1413×, 1494; Ash, 1276×; Bamboo, 449; Beech, 673; -bell, 642, 3116; -bell, California, 2566×; -bell Creeper, Australian, 3189; -bells, 2039; Bells of Scotland, 649×; -bottle, 711×; Cohosh, 695; Couch-Grass, 939×; Curls, 3377; Daisy, 1205×; Dawn-Flower, 1660; -eyed Grass, 3171; Fescue, 1228×; Gentian, 1323×; Grape, 3489×; Grass, Canada, 2723×; -Grass, English, 2723×; -Grass, Kentucky, 2723×; -Grass, Texas, 2723×; Gum, 1153×; Gum, Dwarf, 1154; Huckleberry, 1320; Jack, 2890; -Joint, 617; -leaved Wattle, 184×; Lotus, 2310×, 2311; Lupine, 1923; Marguerite, 1205×; Myrtle, 3471; Oxalis, 2475×; Palm, 1140×, 3045; Palmetto, 2926; Spirea, 679; Squill, Common, 3117.
Blueberry, Bear, 3424; Canada, 3423; Downy Swamp, 3423; Hairy, 3424; High-Bush, 3423; Low, 3423×; Swamp, 3423.
Bluet, 711×, 1611; Mountain, 712×.
Board publications, 1553.
Boat Orchid, 289×.
Bœhmeria nivea, 26×.
Bog-Asphodel, 2113×; Bilberry, 3424; -Gardening, 2666×.
Bohea Amherstiana, 526.
Bois d'Ecorce, 3527×; de fer, 3221×; -flot, 293.
Bokhara Clover, 2026.
Bolboxalis cernua, 2418×.
Boldea, 2565×.
Boldo, Chilean, 2565×.
Boldoa fragrans, 2565×.
Bolelia, 1068.
Boletus, 2088.
Bolle's Poplar, 2756.
Bolusafra, 1201.
Bolusanthus speciosus, 1904.
Bombacaceæ, 53.
Bombax Family, 53; Gossypium, 2016×; guineense, 700; pentandrum, 700.
Bonapartea filamentosa, 238; flagelliformis, 238×; glauca, 238×, 966; gracilis, 966; histrix, 238×; juncea, 238×; juncea rigidifolia, 238×; rigida, 238×; rigidifolia, 238×; robusta, 238×; striata, 238×; striata pulverulenta, 238×; stricta, 238×; tenuifolia, 238×.
Bonatea speciosa, 1424.
Bone Flower, 486; -set, 1164; -set, Upland, 1167; -wort, 486.
Bongardia Rauwolfii, 1839×.
Books, 1520×.
Boot-jack Bur, 500.
Boottia, 14×.
Borage, 911×; Family, 69.
Boraginaceæ, 69.
Borago officinalis, 69, 911×.
Boraphila, 3092.
Borassus flabelliformis, 16×; Sonnerati, 1899×.
Boretta cantabrica, 950; cantabrica rosea, 950.
Boschniakia, 1824×.
Bosia, 526.
Bossekia, 3021; deliciosa, 3024×; odorata, 3024×; parviflora, 3024×.
Boston Ivy, 2478×.
Boswellia Carteri, 45×.
Bothriocline Schimperi var. tomentosa, 1136.
Botryanthus, 2080×.
Botryodendrum Sinclairii, 2040.
Bottle-Brush, 630, 2044; -brush Grass, 1634×; Gentian, 1326×; Gourd, 1774×; Palm, 2810; -Tree, 3239×.
Bottom Shellbark-Hickory, 678.
Boucerosia campanulata, 660×; Simonis, 661.
Bougueria, 2656×.
Bouncing Bet, 3075.
Bourbon Aloe, 1903×; Lily, 1868×; Rose, 2988×; Tea, 23.
Bourdon, 2911.
Bower Plant, 2452; Brasilian, 216×.
Bowman's Root, 1338.
Bowstring Hemp, 3070.
Box, Australian Gray, 1153×; -berry, 1319; Black, 1153; Brisbane, 3384; Elder, 204×; -leaved Milkwort, 2738; Poplar, 1152×; Red, 1152×; -Thorn, 1929×; Tree, Bastard, 1155; Victorian, 2654; White, 1153×; Yellow, 1158×.
Boykinia occidentalis, 1475.
Brabeium stellatifolium, 27.
Brachyacanthæ (Cratægus), 886×.
Brachyanthæ (Salvia), 3062×.
Brachycarpæ (Pachira), 2423×.
Brachyceras (Nymphæa), 2310×.
Brachychiton acerifolium, 3239×; Bidwillii, 3239; Gregorii, 3239×; populneum, 3239×.
Brachyloma erianthum, 1706.
Bracken, 2851×.
Brackett, G. B., 3554; G. C., 1565×.
Bracteatæ (Rosa), 2996×.
Bradburya virginiana, 714.
Bradleia, 2606; frutescens, 3518.
Brahea armata, 1140×; edulis, 1140×; filamentosa, 3507; filifera, 3507; glauca, 1140×; Roezlii, 1140×.
Brain Cactus, 2525.
Brake, Cliff, 2535; Rock-, 903×.
Brakes, 2851×.
Bramble, 3021; fruits, history, 1515×.
Bramia, 1477×.
Branching Asphodel, 412×.
Brasiletto, 612×.
Brassaiopsis, 1438×.
Brassavola, 2401×; Digbyana, 1770×; glauca, 1770×.
Brassia, 2401×.
Brassica, 36×; pekinensis, 3582; Pe-tsai, 3582.
Brauneria angustifolia, 1088; purpurea, 1088.
Brayodendron texanum, 1015×.
Brazil Cress, 3205×; -Nut, 494; Rubber, 1482×.
Brazilian Bower-Plant, 216×; Guava, 2848×; Morning-Glory, 1661.
Brasiline, 42.
Bread-and-cheese, 2652; -But, 579; -Fruit, 401×; -root, Indian, 2849×; -root, Missouri, 2849×.
Breath of Heaven, 214×.
Breck, Joseph, 1566.
Breiapfelbaum, 3073×.
Breynia fruticosa, 281×; nivosa, 2606.
Briar, Austrian, 2995×; Copper Austrian, 2995×.
Bridal Rose, 3029.
Bride, The, 286×.
Bridgesia spicata, 1127.
Bridgeman, Thomas, 1566.
Brier, Bamboo, 3174; Cat-, 3174×; False China, 3175; Horse-, 3174; Rose, 3029; Saw-, 3174×; Sensitive, 3115.
Brinckle, W. D., 1566.
Brisbane Box, 3384; Lily, 1175×.
Bristly Sarsaparilla, 344×.
British Columbia, 573×.
Brittle Willow, 3052.
Briza geniculata, 1126.
Brisopyrum siculum, 991.
Broad Bean, 3464×; -leaved Garden Anemone, 285×; -leaved Ironbark, 1152×; -leaved Wattle, 184×; -Thorn Acacia, 599.
Brodiæa coccinea, 558×; uniflora, 3384×; volubilis, 3278.
Brome-Grass, 578×; Awnless, 578×; Schrader's, 579.
Bromelia exsudans, 1395; longifolia, 3272×; Pinguin, 18×; pyramidalis, 504; sphacelata, 1412; variegata, 2121; sebrina, 503×.
Bromeliaceæ, 18.
Bromus pratensis, 1228×.
Broom, 946×; Butcher's, 3037×; Climbing Butcher's, 3142×; -corn, 1497; -corn Millet, 2452×; Crowberry, 844; Leafless Rush-, 3470×; Pink, 2291; -Rape, 1824×, 2409×; Scotch, 948; Sedge, 282×; Spanish, 3201×; Wattel, 181×.
Brosimum Alicastrum, 2300×.
Broughtonia, 2401×.
Browallia Jamesonii, 3276.
Brown Bent, 241; -flowered Shrub, 2046; Mustard, 544×.
Brown, J. G., 1566×.
Brugmansia, 970; arborea, 971; cornucopia, 971; Knightii, 971.
Bruisewort, 486.
Brunella, 3583.
Bruner, T. K., 1566×.
Brunfelsia americana, calycina, eximia, floribunda, macrantha, pubescens, 3574.
Brunia Family, 39×.
Bruniaceæ, 39×.
Brunsvigia ciliaris, 599×; toxicaria, 599×.
Bryales, 7.
Bryant, Arthur, 1567.
Bryanthus Breweri, 2607×; cæruleus, 2607×; empetriformis, 2607×; erectus, 2607×; glanduliflorus, 2607×; taxifolius, 2607×.
Bryonia alba, 76; punctata, 2033×; scabrella, 2034.
Bryony, 583×; Black, 3309.
Bryophyta, 6.
Bucare, 1142.
Buchnera canadensis, 3446×.
Buchu, 44×, 454×.
Buckbean, 2037; -berry, 1320.
Buckeye, 226; California, 227; Mexican, 3414; Ohio, 227×; Red, 228; Sweet, 227×.
Buckleya umbellulata, 3570×.
Buck's-horn Plantain, 2656×.
Buckthorn, 599, 2923; Family, 51; Sea, 1494×.
Buckwheat Family, 28×; Tree, 803.
Budd, J. L., 1567.
Buddleia Farquaharii, 3566×.
Buffalo Currant, 2958; Horn, 599; -Nut, 2865; Pea, 3332; Thorn, 398×.
Bugbane, 769×.
Bugle-Weed, 242.
Buist, Robert, 1567.
Bulbinella Hookeri, 766×; yedoensis, 244×.
Bulbophyllum, 2401×; amplum, 3078; bufo, 2021; falcatum, 2021×; lepidum, 774×; paleaceum, 1656.
Bullace, 2826; Grape, 3484.
Bull Bay, 1968, 2556; Grape, 3484; Pine, 2642×, 2645×; Thistle, 774×; -Thorn, 599.
Bull, E. W., 1567×.
Bullatæ (Primula), 2796×.
Bullit Grape, 3484.
Bullock's-Heart, 294.
Bull's Blood, 2007.
Bulrush, 3119; Great, 3119×.
Bumbum, 1984×.
Bunch-Flower, 2023; Grape, 3489×.
Bundy, 1155.
Bungulan, 2079.
Bunium Bulbocastanum, 2300×.
Bunya-bunya, 346×.
Buphane toxicaria, 20×.
Bur Cucumber, 908×, 3161×; -Marigold, 500; N. Zealand, 190; Oak, 2887; -Reed, 3200×.
Burdock, 385.
Burgundian Rose, 2989×.
Burlingtonia candida, 2974; decora, 2974; decora var. picta, 2974; fragrans, 2974; pubescens, 2974×; venusta, 2974.
Burmese Rosewood, 2853×.
Burnet, 2776×, 3070.
Burnet, Robert, 1567×.
Burning-Bush, 1004, 1187×.
Burpee, W. Atlee, 3554.
Burr, Fearing, 1567×.
Burrielia gracilis, 442.
Bursera Family, 45; serrata, 2812×.
Burseraceæ, 45.
Bush Clover, 1844×; Grape, 3485; Moonflower, 1658×.
Bush, Isador, 1568.
Bushman's Poison, 209; -tick Berry, 2414×.
Bushukan, 781×.

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Butea frondosa, 42.
Butcher's Broom, 3037×; Climbing, 3142×.
Butneria, 637×.
Butômaceæ, 14.
Butryospermum Parkii, 2300×.
Butter-and-Eggs, 1884.
Buttercup, 2905; Bermuda, 2418×; Family, 32; Primrose, 2791.
Butterfly Flower, 3111; Lily, 1441; Orchid, 1119×, 2346×; Orchis, 1424×; -Pea, 714, 803×; Tulip, 634×; -Weed, 404×.
Butternut, 494, 678×, 1721.
Butterwort, 2631×; Mexican, 2631×.
Buttonball, 2708; Bush, 714×; Snakeroot, 1138, 1852×; -wood, 2706×.
Butz, G. C., 1568.
Buxaceæ, 47.
Buxus Family, 47; sempervirens, 47×, 1439×; suffruticosa, 1439×.
Byttneria, 587.

Cabbage, Caraibe, 18; Deer, 1922×; Kerguelen's Land, 2809; Palm, 1176×, 2405; Palmetto, 3044×; Rose, 2989; St. Patrick's, 3096; Skunk, 3295; Tree, 281, 843.
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Cabuya, 1305×, 1306×.
Cacalia coccinea, 1112; ovalis, 1422; radicans, 3150; sagittata, 1112; sonchifolia, 1112.
Cacao, 3331.
Cacara erosa, 2425×.
Cachibou Resin, 600×.
Cachiman, 2074×; -Cochon, 293; Montagne, 2975×; Morveux, 2975×.
Cactaceæ, 57×.
Cactus, Agave, 1848; Bird, 2524×; Brain, 2525; chiloensis, 722×; Christmas, 3550; Crab, 3549×; Dahlia, 952×; Easter, 3113×; Family, 57×; Foxtail, 1979; Hatchet, 2534; Hedge, 723; lanatus, 2404; Old Man, 715; pentagonis, 191×; Pereskia, 2547; Rainbow, 1095; Rat-tail, 312×; Redbird, 2524×; Sea-Urchin, 1097; Snake, 2525; stellatus, 1979×; Vine-, 1271.
Cæsalpinia echinata, 42; inermis, 2536×; kauahiensis, 2045×; kavaiensis, 2045×; lacerans, 2854×.
Caffir Thorn, 1930.
Cafta, 686.
Cahum, 1305×.
Caimito, 767.
Caja, 3217; Manga, 3216×.
Cajophora lateritia, 518.
Cajuput Tree, 2022×.
Calaba Tree, 636×.
Calabash Gourd, 1774×; Nutmeg, 2062; Tree, 890.
Calabazilla, 910.
Calabrian Pine, 2641×.
Caladium, Black, 830; esculentum, 830; violaceum, 830; zamiæfolium, 3533×.
Calamintha Acinos, 3082×; alpina, 3082×; corsica, 3082×; hortensis, 3082×; montana, 3082×; officinalis, 3082×.
Calamondin Orange, 784×.
Calampelis scaber, 1085×.
Calamus calicarpus, 951; Draco, 17; Lewisianus, 951; Verschaffeltii, 194.
Calanchoë, 1731×.
Calandrinia columbiana, 1852; Cotyledon, 1852; Howellii, 1852; Leana, 1852; oppositifolia, 1852; pygmæa, 1852; Tweedyi, 1851×.
Calanthe, 2401×; rosea, 1879×.
Calathea bambusacea, 1688×; bella, 1995×; bicolor, 1995×; major, 1688×; smaragdina, 2063; splendida, 1995; undulata, 1995×.
Calboa vitifolia, 2879×.
Calceolaria, nomenclature, 3583.
Calendula officinalis, 77, 911×; pluvialis, 1011; Pongei, 1011.
Calibanus cæspitosus, 2148; Hookerii, 2148.
Calico Bush, 1734; Flower, 394.
California, 2284×; Big Tree, 3154; Black Currant, 2959; Black Oak, 2884; Bluebell, 2566×; Buckeye, 227; Dewberry, 3032×; Fuchsia, 3538×; Geranium, 3152×; Laurel, 3413×; Live Oak, 2889×; Nutmeg, 3360×; Okra, 1921; Pepper-Tree, 3109; Phlox, 1883; Poppy, 1145×, 2712; Privet, 1861; Redwood, 3153×; Rose, 839; Yellow- or Golden-Bells, 1112.
Calimeris tatarica, 1480.
Calisaya Bark, 770.
Calla æthiopica, 3536×; Black, 402×; Black-throated, 3536; Common, 3536×; Elliottiana, 3536; Fringed, 392; Golden, 3536; Little Gem, 3536×; oculata, 3536×; palustris, 17×; Pentlandii, 3536×; Pink, 3536; Rose, 3536; Spotted, 3536; Yellow, 3536×.
Calliandra geminata, 2653; latifolia, 2653.
Callianthæ (Primula), 2807.
Callias Dichrostachys, 1003×.
Calliglossa Douglasii, 1832×.
Calligonum Pallasia, 28×.
Calliopsis marmorata, 845.
Calliphruria subedentata, 1161.
Callistachys, 2420.
Callistemon coccineus, 3566×; Cunninghamii, 3566×; floribundus pendulus, 3566×; hybridus, 3566×; robustus, 3566×; splendens, 3566×.
Calloosa Grape, 3490.
Calobotrya sanguinea, 2958.
Calocarpum mammosum, 1919.
Calocephalus, 1849×.
Calodendrum capensis, 2301.
Calompit, 3322.
Calonyction grandiflorum, 1661×.
Calophanes, 1084×.
Calopogon pulchellus, 1883.
Calosanthes indica, 2410×.
Caloseris rupestris, 2354×.
Calosphace (Salvia), 3062.
Calospira (Spiræa), 3210×.
Calostachydes (Stachys), 3220.
Calothyrsus (Æsculus), 227.
Caltrop Family, 44.
Calotropis procera, 68.
Caltrops, Water, 3371×.
Calumba, 1719×.
Calumbang, 245×.
Calycanthaceæ, 34.
Calycanthus Family, 34; floridus, 34×; præcox, 2037×.
Calypeo, name of, 3583; bulbosa, 3583.
Calyptrion Aubletii, 860×.
Calyptrogyne Swartzii, 1330.
Calyptronoma Swartzii, 1330.
Calyptropsidium Friedrichsthalianum, 2848.
Calyptrostigma, 1009.
Calysaccion, 2319.
Calystegia dahuricus, 840; pubescens, 839; Sepium, 839×; villosa, 839.
Camaba, 1915.
Camass, 639×.
Camassia esculenta, 19×.
Camel Hay, 938×.
Camellia cuspidata, 3328×; euryoides, 3328×; maliflora, 3328×; rosæflora, 3328×; spectabilis, 3405; Thea, 3328×; theifera, 3328×.
Camel's Thorn, 246.
Camel-thorn, 189×.
Cammarum, 1127.
Campanula aurea, 2089×; grandiflora, 2711; serpyllifolia, 3495; Speculum, 3203×.
Campanulaceæ, 76.
Campanumæa gracilis, 1842; lanceolata, 819×.
Campbell, G. W., 1568.
Campderia, 807×.
Campeachy Wood, 1427×.
Camperdown Elm, 3410×.
Campernelle Jonquil, 2111.
Campestria (Acer), 198.
Camphire, 1831.
Camphor, 35×, 1418; Tree, 773.
Camphora officinarum, 773.
Campion, 3163×; Bladder, 3165×; Evening, 1928×; Morning, 1928×; Moss, 3167×; Red, 1928; Starry, 3166; White, 1928×.
Campsidium filicifolium, 2452.
Campteria Wallichiana, 2853.
Camptosorus rhizophyllus, 1217.
Campylobotrys chinensis, 1845×; discolor, 1496; Ghiesbreghtii, 1496; macrocarpa, 1845×; regalis, 1496.
Campyloneuron Phyllitidis, 2745.
Camwood, 453.
Canada, 559×; Balsam, 12×, 1418; Blueberry, 3423; Blue-Grass, 2723×; Leaf-Cup, 2744; Lyme-Grass, 1111×; Plum, 2828; Snakeroot, 404.
Canadian Balsam, 174.
Canaigre, 3037.
Canal Zone, 2150.
Cananga odorata, 652×.
Canarium luzonicum, 2301.
Canary-bird Flower, 3389×; -Grass, 2573×; -Grass, Reed, 2573×; -Grass, Toowoomba, 2574.
Cancer-root, 1824×.
Cancho Blanco, 3072×.
Candelabrum Tree, 2451×.
Candelillo, 1169×.
Candleberry Tree, 245×.
Candlenut, 245×; Plant, 3149×; -stick Lily, 1877; -tree, 2475; -wood, 1271; -wood Family, 55.
Candollea adnata, 3279; Brunoniana, 3279; ciliata, 3279; dichotoma, 3279; graminifolia, 3279.
Candytuft, 1635; Annual, 1635×, 1636; Fragrant, 1635×; Rocket, 1635×; Sweet-scented, 1635×.
Cane, Large, 446; Scutch, 446; Small, 446; Switch, 446.
Caninæ (Rosa), 2990.
Canistel, 1919.
Canistrum, 221×; Lindenii, 1419×.
Cankrienia (Primula), 2805.
Canna coccinea, 22×; edulis, 22×; Family, 22×.
Cannabis indica, 26×; sativa, 26×.
Cannaceæ, 22×.
Cannon-ball Tree, 871.
Canoe Birch, 499.
Canon Grape, 3488.
Canterbury Bells, 644.
Cantharellus cibarius, 2087×.
Caoutchouc, 67×, 266×; Lagos, 1305; Tree, 1482×.
Cape Blue Water-Lily, 2311×; Chestnut, 635×; Cod Water-Lily, 2312×; Cowslip, 1764×; Fuchsia, 2604×; Gooseberry, 2609; Gooseberry, Dwarf, 2609; Honeysuckle, 3318; Ivy, 3150; Jasmine, 1315×; Marigold, 1011; Periwinkle, 3471×; Pittosporum, 2654; Pond-weed, 311×; Primrose, 3272×.
Caper Family, 36×; Spurge, 1173.
Capitatæ (Primula), 2800.
Capnorchis, 1001×.
Capnorea nana, 1479×; pumila, 1479×.
Capparidaceæ, 36×.
Capparis spinosa, 37.
Caprifoliaceæ, 74×.
Caprifolium Fraseri, 1912×; Hallianum, 1910×; hortense, 1912×; Niaguarilli, 1908; perfoliatum, 1912×; Periclymenum, 1913; proliferum, 1912; pubescens, 1911×; sempervirens, 1911.
Capriola dactylon, 939×.
Capsella Bursa-pastoris, 36×.
Capsicum annuum, 71.
Caracol, 2574×.
Caraguata cardinalis, 1419×; Devansayana, 1419×; lingulata, 1419×; lingulata splendens, 1419×; Melinonis, 1419×; splendens, 1419×.
Caraibe Cabbage, 18.
Carambola, 435×.
Carara didyma, 3148×.
Caraunda, 664.
Caraway, 911×.
Carbenia benedicta, 806.
Carbao's Teats, 3419×.
Cardamomum officinale, 1109×.
Cardamons, 274×, 275, 1109.
Cardiaca vulgaris, 1840×.
Cardinal Flower, 1898×; Salvia, 3063×.
Cardiocrinum, 1877×.
Carduus afer, 775; arvensis, 774×; benedictus, 806; Casabonæ, 775; Diacantha, 775; lanceolatus, 775; Marianus, 3169; muticus, 775; oleraceus, 775; tinctorius, 675.
Carib Apple, 1306×.
Carica Papaya, 57.
Caricaceæ, 57.
Caricature Plant, 1393.
Carludovica palmata, 17.
Carman, E. S., 1568.
Carnauba Palm, 840×; Wax, 16×.
Caroá, 2121×.
Carob, 717×.
Carolina Allspice, 637×; Hemlock, 3391×; Moonseed, 808×; Poplar, 2759; Poplar, Hybrid, 2760; Vanilla, 3380×; Vetch, 3465×; Yellow Jessamine, 1321×.
Carolinæ (Rosa), 2991.
Carolinea princeps, 2423×.
Carolinella (Primula), 2797.
Carosella, 1252.
Caroubier, 717×.
Carpet-Grass, 2479×; -weed Family, 30.
Carpinus Betulus, 1439×; caroliniana, 1439×.
Carr, Robert, 1568×.
Carragheen, 5×.
Carrion Flower, 3224×.
Carthamine, 77×.
Carthamnus tinctorius, 77×.
Carum Carui, 62×, 911×; Petroselinum, 2563×.
Carumbium populifolium, 1499.
Carya, 25; nomenclature, 3584; spp., 2301.
Caryocar spp., 2301.
Caryocedrus, 1727.
Caryophyllaceæ, 31.
Caryophyllus aromaticus, 1163×, 3589.
Caryopitys edulis, 2639.
Caryota, 2445.
Caryotaxus, 3360.
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Cascara segrada, 51, 2924×.
Cascarilla, 902; Bark, 47.
Cascaria esculenta, 56×.
Cashew, 279×; Apple, 279×; Family, 48.
Casicta, 2620.
Cassabanana, 3161.
Cassandra calyculata, 732.
Cassava, 1991; Bitter, 1991×; Bread, 47; Sweet, 1992.
Cassebeeria, 3189×.
Cassena, 1640.
Cassia-Bark Tree, 773×; Cinnamon, 35×; -Flower Tree, 773×; lignea, 808×; nictitans, 41×; polyantha, 3566×.
Cassie, 188×.
Cassine, 1640; Maurocenia, 2013.
Castalia, 2306.
Castanea chrysophylla, 682×; spp., 2301.
Castanopsis ceratacantha, 2891; cuspidata, 2479×, 2891; cuspidata var. latifolia, 2891; cuspidata var. variegata, 2891; Fargesii, 2891; platyacantha, 2891×; sclerophylla, 2891×.
Castanospermum australe, 41×, 2301×.

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Castor Bean, 2965×; Oil, 46×; -Oil Plant, 2965×.
Casuarina equisetifolia, 23×; Family, 23.
Casuarinaceæ, 23.
Catalonian Jasmine, 1718×.
Catasetum, 2402.
Cat-Brier, 3174×; Grape, 3486×; -tail, 3405×; -tail Family, 13; -tail, Red-hot, 191.
Catchfly, 3163×; Bladder, 3165×; German, 1928×; Royal, 3167; Sweet William, 3165.
Catecu, 74×.
Catevala arborescens, 260.
Catgut, 3321×.
Catha edulis, 49.
Cathartolinum virginianum, 1887.
Cathcartia integrifolia, 2018×.
Cathea, 636×.
Catjang, 3469×.
Catmint, 2130.
Catnip, 70, 911×, 2130.
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Cattleya, 2402; Brysiana, 1771; crispe, 1771; elegans, 1772×; exoniensis, 1773×; lobata, 1771; marginata, 1770; Perrinii, 1771×; pumila, 1770.
Caulanthon, 2653.
Caulescentes (Streptocarpus), 3273×.
Cavan, Espino, 188×.
Cayenne Cherry, 3281×; Pepper, 658×.
Cayratia japonica, 775×; oligocarpa, 775×.
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Ceanothus africanus, 2148.
Ceara Rubber Tree, 1992.
Cebatha carolina, 808×; orbiculata, 808×.
Cedar Elm, 3413; Incense, 1854; Pine, 2645×; Red, 1728×; White, 730×, 1854, 3335; Yellow, 730×.
Cedrela odorata, 45×.
Celandine Poppy, 736, 3279; Tree, 518.
Celastraceæ, 49.
Celastrus buxifolius, 1420×; edulis, 686; nutans, 2894×; Orixa, 2407; serratus, 1420×.
Celery, Wild, 3428.
Celosia cristata, 29×.
Celsia Arcturus, 3566×; urticæfolia, 261.
Celtis mississippiensis, 357; occidentalis, 357; orientalis, 3372×.
Cembra (Pinus), 2637.
Cembroides (Pinus), 2638×.
Cemeteries, 1807.
Centaurea benedicta, 806; conifera, 1851; cynaroides, 2927; orientalis, 3567; Rhapontieum, 2927.
Centauridium Drummondii, 3521.
Centaurium, 3589.
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Centroclinium adpressum, 2354; reflexum, 2354×.
Centrostemma Lindleyanum, 1613; multiflorum, 1613.
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Cephalandra palmata, 807.
Cephalophora, 1371; aromatica, 1443.
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Cephalotus Family, 38×.
Ceraseidos apetala, 2842.
Cerasus avium, 2837×; Bigarella, 2838; borealis, 2836; Capollin, 2842×; caproniana, 2836×; Caproniana flore roseo pleno, 2839; caroliniana, 2844; Chamæcerasus, 2836×; decumana, 2838; demissa, 2843; dulcis, 2837×; duracina, 2838; emarginata, 2836; Fontanesiana, 2838; ilicifolia, 2844; incana, 2835; incisa, 2842; itosakura, 2841; japonica, 2841; japonica pendula, 2836×; Juliana, 2838; Juliana flore roseo pleno, 2839; Lannesiana, 2839×; Laurocerasus, 2843×; Mahaleb, 2835×; microcarpa, 2835; mollis, 2836×; nigra, 2837×; Padus, 2843; pendula, 2841; pennsylvanica, 2836; persicifolia, 2836; Phœsia, 2840×; prostrata, 2835; Puddum, 2840×; regalis, 2838; semperflorens, 2837×; serotina, 2842×; serotina var. asplenifolia, 2842×; serratifolia, 2838; serrulata, 2838; sibirica, 2836×; Sieboldii, 2840; tomentosa, 2835; virginiana, 2843; vulgaris, 2836×; Watereri, 2840.
Ceratolobus Forgetiana, 3177×.
Ceratonia Siliqua, 41×.
Ceratophyllæ (Saxifraga), 3089.
Ceratopteridaceæ, 8×, 1208×.
Ceratopteris Family, 8×.
Ceratostylis himalaica, 2966×.
Cerbera dichotoma, 3304; parviflora, 2319.
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Ceriman, 2064.
Cerothamnus cerifera, 2092×.
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Chætochloa, 3158.
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Chaiota, 3124×.
Chalcas exotica, 2076; Kœnigii, 2076; paniculata, 2076.
Chamæcerasus, 1906×.
Chamæcistus procumbens, 1902.
Chamæcrista nictitans, 680.
Chamæcyparis decussata, 3337; obtusa var. ericoides, 2922; pisifera var. plumosa, 2922×; pisifera var. squarrosa, 2922; thyoides var. andeleyensis, 2922×; thyoides var. ericoides, 2922×.
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Chamædryon (Spiræa), 3208.
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Chamæledon, 1902.
Chamæmorus, 3023×.
Chamænerion angustifolium, 1121; latifolium, 1121×.
Chamænymphæa, 2313.
Chamæpericlymenum suecicum, 855.
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Chafial, 1362.
Chandelier Tree, 2451×.
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Chaulmugra Oil, 56×.
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Chayote, 3124×.
Chayotli, 3124×.
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Checkerberry, 1319.
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Cheddar Pink, 999.
Cheeses, 1974×.
Cheilanthes, 1214, 1217; pedata, 216×.
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Cheirostemon platanoides, 749×.
Chelem, 232×.
Chelone barbata, 2540; centranthifolia, 2540×; Digitalis, 2452×; glabra, 71; hirsuta, 2543; Pentstemon, 2542×.
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Cherimoyer, 293×.
Cherleria sedoides, 389.
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Chess, 578×.
Chestnut, 2296×; Cape, 635×; Moreton Bay, 683; Oak, 2886×; Oak, Rock, 2886×; Oak, Yellow, 2886; Water, 3371×; Wild, 635×.
Chibou Resin, 600×.
Chickasaw Lima, 653; Plum, 2829×.
Chicken Grape, 3487.
Chick-Pea, 709.
Chickweed, 3234×; Blinking, 2065; Silver, 2476; Water, 2065; -Wintergreen, 3378×.
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Chimney Campanula, 645×.
Chimonanthus fragrans, 2037×; fragrans var. grandiflora, 2037×; nitens, 2037×.
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Chirimoya, 293×.
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Chondrus crispus, 5×.
Chopag, 2319.
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Chrysalidocarpus lutescens, 2445.
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Chrysanthemum inodorum, 2010×; Leucanthemum, 77×; parthenoides, 2011; vulgare, 3309.

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Chrysobotrya intermedia, 2958; Lindleana, 2958; revoluta, 2958.
Chrysocoma vulgaris, 1886×.
Chrysogonum Dioscoridis, 1839×.
Chrysophyllum Cainito, 65×; imperiale, 2004×.
Chrysopogon nutans, 3198×.
Chrysurus aureus, 1776×; cynosuroides, 1776×.
Chuchu, 3124×.
Chucumci, 232×.
Chumpa, 2078×.
Chusquea, 449×.
Cibotium, 1209×.
Cicca disticha, 2606×.
Cicely, Sweet, 2095×.
Cicer arietinum, 41×.
Cichorium Endivia, 77×; Intybus, 77×.
Ciconium, 2531.
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Cienkowskya Kirkii, 1731×.
Cinchona Ledgeriana, 74×; succirubra, 74×.
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Cladrastis amurensis, 1938; amurensis var. floribunda, 1938; Tashiroi, 1938.
Clandestina rectiflora, 1824×.
Clarkia Breweri, 1160; concinna, 1160; grandiflora, 1160; Saxeana, 1160.
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Clavaria, 2088.
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Claytonia parviflora, 2065; parvifolia, 2065; perfoliata, 2065; tuberosa, 30×.
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Cleistanthus collinus, 1832×.
Clemanthus senensis, 2058×.
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Clusia flava, 54×; rosea, 54×.
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Cochemica, 1977.
Cochil Sapota, 680.
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Cochlearia acaulis, 1656; Armoriacia, 2895×; saxatilis, 1736×.
Cochlioda, 2402.
Cochlospermum Gossypium, 2016×; hibiscoides, 2016×; serratifolium, 2016×.
Cockscomb, 709.
Cock's Eggs, 3055×.
Cockspur Thorn, 884.
Cocos, 53, 3331; -butter, 53; -Plum, 766×.
Coco-cola, 53; de Mer, 1899×; -Grass, 942×; Palm, 815.
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Cocos, 2445; maldivica, 1899×; nucifera, 16×, 2301×; schizophylla, 3567.
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Codonocrinum, 894.
Codonopsis gracilis, 1842.
Codonoraphia, 1333×.
Cœlanthus complicatus, 1765.
Cœlogyne, 2402; Gardneriana, 2121×.
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Coleman, N. J., 1569.
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Colocynthis officinalis, 780.
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Conium maculatum, 62×.
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Conocephalus niveus, 973×.
Conoclinium cœlestinum, 1166×; ianthinum, 1165; Lasseauxii, 1165.
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Constantinople Nut, 859×.
Convallaria majalis, 19×.
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Coreopsis aristosa, 500×; aurea, 500; calliopsidea, 1843×; Douglasii, 1843×; gigantea, 1843×; integrifolia, 1473; maritima, 1843×; trichosperma, 500×.
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Couch-Grass, Blue, 939×.
Cougnerecou, 3526×.
Countess' Powder, 770.
Country Fig, 3077.
Courantia rosea, 870×.
Courbaril, 1626.
Couroupita guianensis, 59×.
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Crassina, 3544×.
Crassula coccinea, 2969; jasminea, 2969.
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Craterellus cornucopioides, 2088.
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Creosote, 25×.
Crepis barbata, 3353.
Crescentia Cujete, 2301×.
Cress, 1841; Bell Isle, 454; Brasil, 3205×; Common Winter, 454; Early Winter, 454; Para, 3205×; Penny, 3333; Rock-, 343; Upland, 454; Water-, 2895×.
Crested Dog's-tail, 940.
Crete Dittany, 2046×.
Crimean Linden, 3347; Pine, 2641×.
Crimson Bells, 1482; Chinese Rose, 2988; Clover, 3379; -Eye Rose-Mallow, 1486×; Flag, 3113; -flowered Eucalypt, 1152; Fountain Grass, 2537×; Glory Vine, 3491×; Rambler Rose, 2985.
Crinodendron dependens, 3377×; Hookerianum, 3377×; Patagua, 52, 3377×.
Crinum quitense, 2568; zeylanicum, 20×.
Crispæ (Clematis), 790×.
Cristaria coccinea, 1975.
Crithmum maritimum, 912.
Crocus, Autumn, 824×; Chilean, 3318; sativus, 21.
Crosnes du Japan, 3220×.
Cross-leaved Heath, 1130×; -Vine, 503; -wort, 902×.
Crossyne ciliaris, 599×.
Croton, 815×; bicolor, 1189; Eluteria, 47; Oil, 46×; pictus, 816×; sebiferus, 3073; Tiglium, 46×; tinctorius, 753; variegatus, 816×; various names, 3586.
Crowberry, 1112×; Broom, 844; Family, 47×.
Crow-Foot, 950×, 2905; -Vituals, 2130×.
Crownbeard, 3446×; Virginia, 3447.
Crown Imperial, 1282; of Thorns, 1170; Vetch, 855×.
Crozophora tinctoria, 47.
Cruciata verticillata, 1328.
Cruciferæ, 36×.
Cruel Plant, 938×, 2610.
Crula cissifolia, 204.
Crus-galli (Cratægus), 884.
Cryptanthe, 1758×.
Cryptogramma acrostichoides, 1217.
Cryptophragmium ceylanicum, 1421.
Cryptopyrum Richardsonii, 3385.
Ctenostachys (Limonium), 3231.
Cuban Lily, 3117×.
Cubeb, 2646×.
Cubeba officinalis, 2646×.
Cubebs, 24.
Cubelium concolor, 1618.
Cuckoo Flower, 661, 1929; -Pint, 403.
Cucubalus latifolius, 3165×.
Cucumber, Bur, 908×, 3161×; -leaved Sunflower, 1448; Mandera, 909; Melon, 908; -Root, Indian, 2019; Snake, 908; Squirting, 1085; Tree, 435×, 1967×; Tree, Large-leaved, 1966×; Wild, 1096;
Cucumis Colocynthis, 780; maderaspatanus, 2034; Melo, 76; perennis, 910; sativa, 76.
Cucurbita, 76; Lagenaria, 1774×; leucantha, 1774×.
Cucurbitaceæ, 75×.
Cudrania javanensis, 26×.
Cuernitos, 599; de Veracrus, 599.
Culcita, 1209×.
Cultivated Oats, 435×.
Culver's Root, 3449×.
Cumburtu, 346.
Cumin, 911×.
Cuminum odorum, 911×.
Cunninghamia cupressoides, 427; selaginoides, 427.
Cunonia Family, 39×.
Cunoniaceæ, 39×.
Cup-and-Saucer, 644; -Flower, 2144×; Plant, 3169.
Cupang, 2474×.
Cupania sapida, 515.
Cuphea arvensis, floribunda, Hookeriana, jorullensis, Roezlii, tricolor, 3567×.
Cupressus disticha, 3314×; formosensis, 732; Hodginsii, 1252×; Lawsoniana, 730×; Lawsoniana argentea, 731; nootkatensis, 730×; obtusa, 731; pisifera, 731×; thyoides, 730×; thyoides variegata, 730×.
Curare, 67.
Curatella americana, 53×.
Curcuma, 22; angustifolia, 397; longa, 22.
Curled Mallow, 1974×.
Curly Dock, 3037; -Grass, 3110×; -Grass Family, 9; Palm, 1612×.
Curmeria picturata, 1499×; Wallisii, 1499.
Currant, 2956; Alpine, 2960; American Black, 2959; Buffalo, 2958; Californian Black, 2959; Cherry, 2960; European Black, 2959; Fetid, 2959; Garden, 2960; Golden, 2958; Grape, 3485; Indian, 3293; Missouri, 2958; Northern Red, 2960; Red, 2960; Skunk, 2959; Swamp Black, 2960×; Swamp Red, 2959×; Tomato, 1932.
Currawang, 189×.
Curtis, Joseph, 1570×.
Curuba, 3161.
Cururu, 50×.
Cuscuaria marantifolia, 3119.
Cuscuta Epilinum, 68×.
Cushaw, 910.
Cushion Pink, 3167×.
Custard-Apple, 291, 294; Family, 34×.
Cut-leaved Blackberry, 3030×; Lavender, 1829.
Cyamopsis tetragonoloba, 1414×.
Cyanitis sylvatica, 1003×.
Cyanococcus (Vaccinium), 3422×.
Cyanophyceæ, 4.
Cyanophyllum magnificum, 2047; spectandum, 2047.
Cyanotis axillaris, 18×; vittata, 3540.
Cyanus arvensis, 711×.
Cyathea, 1209×, 1210, 1214; Family, 8.
Cyatheaceæ, 8, 1209.
Cycadaceæ, 11.
Cycas, 11; Family, 11; Lehmannii, 1113×.
Cyclanthaceæ, 17.
Cyclanthus bipartitus, 17; Family, 17.
Cyclobalanopsis acuta, 2890; glauca, 2889×; Vibrayana, 2890.
Cyclobothra alba, 632×; flava, 635; pulchella, 632×; purpurea, 635×.
Cyclone Plant, 935.
Cyclophorus, 2745.
Cycnoches, 2402; barbatum, 2737×; Lehmannii, 1920×; musciferum, 2737×; Pescatorei, 1920×.
Cydonia cathayensis, 727×; japonica, 728; lagenaria, 728×; Maulei, 728×; Sargentii, 728×; sinensis, 727×. See also 3587.
Cylactus (Rubus), 3023×.
Cymbalaria, 1883×; (Saxifraga), 3086×.
Cymbia occidentalis, 1758.
Cymbidium, 2402; Huttonii, 1371×; Masterii, 940×; Sandersonii, 299; triquetrum, 2346×.
Cymophyllus Fraseri, 663.
Cynanchum sarcostemmoides, 68.
Cynara Cardunculus, 77×; Scolymus, 77×.
Cynodon Dactylon, 15.
Cynoglossum apenninum, 3187; longiflorum, 1885; nervosum, 3567×; nobile, 2091; officinale, 69.
Cynorchis, 2042.
Cynosurus ægyptius, 950×.
Cynoxylon floridum, 854×.
Cynthia virginica, 1758.
Cypella plumbea, 2574.
Cyperaceæ, 15×.
Cyperorchis, 2402.
Cyperus, 16; adenophorus, 3567×; esculentus, 2301×; Papyrus, 2472×; syriacus, 2472×.
Cyphokentia Vieillardii, 943×.
Cypress, Bald, 3314×; Deciduous, 3314×; Hinoki, 731; Italian, 915; Lawson's 730×; Mock, 1755; Monterey, 915; Montesuma, 3315; Pine, 631; Sawara, 731×; Spurge, 1173×; Standing, 1337; Summer, 1755; -Vine, 2879.
Cypripedium, 2402; Ainsworthii, 2604; albopurpureum, 2604; Appletonianum, 2468; Argus, 2469×; barbatum, 2470; barbatum var. Argus, 2469×; barbatum Hookeræ, 2468×; barbatum var. superbiens, 2469×; barbatum var. Veitchii, 2469×; barbatum var. Warnerianum, 2470; bellatulum, 2463×; Boissierianum, 2603×; Boxallii, 2466×; Bullenianum, 2468; Bullenianum Appletonianum, 2468; callosum, 2470×; Cannærtianum, 2464×; cardinale, 2604; caricinum, 2603; caudatum, 2603×; Chamberlainianum, 2466; Charlesworthii, 2467×; ciliolare, 2469×; concolor, 2463×; concolor Godefroyæ, 2463×; Craahawæ, 2467×; Crossii, 2470; cruciforme, 2466; Curtisii, 2469×; Dayanum, 2469; Dominianum, 2604; Drurii, 2467×; Elliottianum, 2464; exul, 2467×; Fairieanum, 2468; glanduliferum, 2464; Godefroyæ, 2463×; grande, 2604; Hartwegii, 2603×; Haynaldianum, 2466; hirsutissimum, 2466; Hookeræ, 2468×; Hookeræ Bullenianum, 2468; Hookeræ Volonteanum, 2468×; insigne 2466×; javanicum, 2469; javanicum virens, 2469; lævigatum, 2464×; Lawrenceanum, 2470×; Lindeni, 2603×; Lindleyanum, 2603; longifolium, 2603×; Lowei, 2466; magniflorum, 2603×; Mastersianum, 2469; Moensianum, 2469×; neo-guineense, 2464; nigritum, 2470; niveum, 2464; orbum, 2470×; pardinum, 2468×; Parishii, 2465×; parviflorum, 23; Pearcei, 2603; Petri, 2469; philippinense, 2464×; Pitcherianum, 2469×; porphyreum, 2604; Poyntzianum, 2468; præstans, 2464; præstans var. Kimballianum, 2464×; purpuratum, 2469, 2470; reticulatum, 2603×; Roebbelenii var. Cannærtianum, 2464×; Roezlii, 2603×; Rothschildianum, 2464; Sanderianum, 2464×; Schlimii, 2602×; Schmidtianum, 2470×; Schomburgkianum, 2603; Schroederæ, 2604; spectabile Dayanum, 2469; Spicerianum, 2468; Stonei, 2465; superbiens, 2469×; superbiens Dayanum, 2469; tonkinense, 2464; tonsum, 2468×; Veitchianum, 2469×; venustum, 2468×; Victoria-Mariæ, 2466; villosum, 2466; virens, 2469; vittatum, 2603; Volonteanum, 2468×; Wallisii, 2603×; Warscewiczianum, 2603×.
Cyprus, 1831; Turpentine, 48.
Cyrilla Family, 48×.
Cyrillaceæ, 48×.
Cyrtanthera chrysostephana, 1714×; Ghiesbreghtiana, 1715; magnifica, 1714×; Pohliana, 1714×; Pohliana var. velutina, 1714×.
Cyrtanthus breviflorus, 208×.
Cyrtoceras floribundum, 1613; multiflorum, 1613.
Crytodeira chontalensis, 1125×; coccinea, 1125×.
Cyrtomium, 1214.
Cyrtopera Woodfordii, 946.
Cyrtopodium, 2402.
Cystopteris, 1217.
Cytisus Adamii, 1763×; alpinus, 1763×; Cajan, 613×; fragrans, 2563×; Laburnum, 1763; Laburnum purpurascens, 1763×; pinnata, 2753; ramantaceus, 2563×; sagittalis, 1323; scoparius, 41×, 42; Weldenii, 2563×.
Czackia Liliastrum, 2473×.

Dactylis glomerata, 15.
Dactyloides (Saxifraga), 3087×.
Dæmonorops, 2445; fissus, 3568.
Daffodil, Hoop-petticoat, 2109; Sea-, 1626; Trumpet, 2109×.
Dagger Fern, 2749.
Dahlia, Climbing, 1490×; Zimapanii, 862.
Dahoon, 1640.

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Daisy, African, 1903×; Blue, 1205×; -Bush, Australian, 2334; Childing, 486; Double-Orange, 1133; Easter, 3361; English, 485×; Giant, 758; March, 486; Michælmas, 416; of New Zealand, 1775; Ox-eye, 758; Paris, 756; Swan River, 539; True, 486; Turfing, 756; White, 1832; Yellow, 3034×.
Dalbergia nigra, 42.
Dalea candida, 2561; purpurea, 2561×.
Dalibarda pedata, 3024.
Dalibardastrum, 3024.
Damask Rose, 2989×.
Dame's Violet, 1479.
Dammar, 1417; Resin, 12×, 230×.
Dammara australis, 230×; Brownii, 230×; robusta, 230×.
Damask Violet, 1479.
Damson, 2826.
Dandelion, 3311; Dwarf, 1758; Fall, 1840.
Dangleberry, 1320.
Daphnanthes, 963.
Daphne cannabina, 59; Gnidium, 58×; Mezereum, 58×; papyrifera, 1099; Tartonraira, 3340×.
Daphnidium gracile, 487.
Darbya umbellulata, 3570×.
Darea (Asplenium), 415.
Darling Plum, 2922×.
Darlington, E. D., 1570×.
Darlingtonia californica, 37×.
Darnel, 1902×.
Dartt, E. H. S., 1571.
Darwin Potato, 3181.
Dasheen, 3312×.
Dasylirion cæspitosum, 2148; flexile, 2148; Hookerii, 2148; junceum, 238×; longifolium, 2147×.
Dasystephana, 1323×.
Datura Stramonium, 70×.
Daubentonia punicea, 3157×; Tripetiana, 3157×; Tripetii, 3157×.
Daucus Carota, 62×.
Davallia, 1214; alpina, 1614; angustata, 1614; brasiliensis, 3047; bullata, 1207; chinensis, 2328×; concinna, 1918; fœniculacea, 1918; Mariesii, 1207; Tyermannii, 1614.
David's Harp, 2739×.
Davilla, 53×.
Dawn-Flower, Blue, 1660.
Dawson, Jackson, 3554.
Dawson Rose, 2985.
Day-Flower, 835×.
Deadman's Fingers, 1423.
Dead Nettle, 1776×.
Deane, Samuel, 1571.
Dearborn, H. A. S., 1571.
Deciduous Cypress, 3314×.
Deckenia nobilis, 3568.
Deckeria, 3568.
Decostea, 1414.
Deerberry, 3421, 3422; D. Cabbage, 1922×.
Deguelia, 988×.
Delabechea rupestris, 3239×.
Delaware, 2210.
Delphinium speciosum, 3568; speciosum glabratum, 3568.
Deltoides (Cratægus), 882×.
Demerara Copal, 1417.
Dempsey, P. C., 1571×.
Dendrium, 1835; buxifolium, 1835×; Hugeri, 1835×; prostratum, 1835×.
Dendrobium acuminatum, 3078; amplum, 3078; Cœlogyne; 3078; cymbidioides, 3078; muricatum var. munificum, 1647×; polystachyon, 2749; Treacherianum, 3078; triflorum, 3078.
Dendrochilum Cobbianum, 2710×; cucumerinum, 2710×; filiforme, 2710×; glumaceum, 2710×.
Dendrophylax funalis, 2745×; Lindenii, 2745×.
Dendropogon usneoides, 3350.
Dennstædtia, 1214×, 1217; cicutaria, 3171×.
Densifloræ (Limonium), 3232.
Deparia, 1214×.
Depressa Gourd, 1774×.
Desert Gum, 1156×; Willow, 747×.
Design in landscapes, 1783×.
Desmanthus plenus, 2136×.
Desmodium japonicum, 1845×; penduliflorum, 1845.
Detarium senegalense, 41×.
Deutzia corymbosa, 2581×; scabra, 39×; spp. 1439×.
Devil-in-a-Bush, 2145×; Tree, 266×; -Wood, 2412×.
Devil's-Bit, 733, 1491; Boots, 3078×; Claws, 189; Hand, 749×; Tongue, 276×; Walking-stick, 344.
Dewberry, California, 3032×; history, 1516; Southern, 3032; Swamp, 3032.
Dewdrop, 479; -Plants, 1077.
Deyeuxia, 617.
Dhak, 59.
Dhal, 613×.
Dhoura, 1497.
Diacanthium (Euphorbia), 1170.
Dianella nemorosa, 20.
Dianthus marginatus, 3568; various names, 3588.
Diapensia Family, 64×.
Diapensiaceæ, 64×.
Diastema gracile, 1005.
Diatomeæ, 4×.
Diatoms, 4×.
Dibrachya, 2530.
Dicentranthera, 425×.
Dichelostemma capitata, 578.
Dichorisandra Warscewicziana, 3364×.
Dicksonia, 1209×, 1214×, 1217; cicutaria, 3171×; pilosiuscula, 987×.
Dicksoniæ, 1209×.
Dicranopteris, 1348.
Dictogramma, 837.
Dictyosperma, 2445.
Dicypellium caryophyllatum, 35×, 805×
Didiscus cærulea, 3362×.
Didymochlæna, 1214×.
Didymosperma caryotoides, 3500×.
Dieffenbachia Seguine, 17×.
Dierama pulcherrima, 3200.
Diervilla, 3588, 3610.
Diffusæ (Veronica), 3450×.
Digger Pine, 2645×.
Digitalis purpurea, 71.
Dilivaria ilicifolia, 195.
Dill, 911×.
Dillenia Family, 53×; speciosa, 53×.
Dilleniaceæ, 53×.
Dilly, Wild, 2056.
Dimocarpus Lichi, 1891×.
Dimorphanthus elatus, 344; mandschuricus, 344×; mandschuricus elegantissimus fol. var., 344×.
Dioscorea Batatas, 21; villosa, 21.
Dioscoriaceæ, 20×.
Diosma fragrans, 214×.
Diospyros Lotus, 66; virginiana, 66.
Diplacus glutinosus, 2055×.
Diplademia Harrisii, 2320.
Diplasium, 1214×.
Diplecthrum, 3083.
Diplopappus, 416.
Diploxylon, 2635.
Dipper Gourd, 1774×.
Dipsacaceæ, 75.
Dipsaceous Gourd, 908×.
Dipsacus ferox, 75×; sylvestris, 75×.
Diptera (Saxifraga), 3093×.
Dirca palustris, 58×
Dircæa cardinalis, 1333×.
Disa grandiflora, 2402.
Disemma, 2480.
Dish-cloth Gourd, 1921.
Distegia involucrata, 1908.
Distegocarpus Carpinus, 673×.
Ditch-Moss, 1110×.
Dittany, 1004; Crete, 2406×; Maryland, 912×.
Dixon, J. N., 1571×.
Dizygotheca crassifolia, 2846; elegantissima, 2746×.
Dock, 3036×; Bitter, 3037; Curly, 3037; Great Water-, 3037; Prairie, 2477×, 3169; Spinage, 3036×; Yellow, 3037.
Dockmackie, 3462×.
Dodder, 922.
Doekoe, 1818×.
Dœllingeria umbellata, 1019×.
Dog-bane, 311; -bane Family, 67×; -bane, Spreading, 311×; -berry, 3195; Fennel, 300; Rose, 2990×.
Dog's-tail-Grass, 940; -Tongue, 3380×.
Dogwood Family, 63; Flowering, 854×; Jamaica, 2648×; Red-Osier, 852×.
Dolichandra cynanchoides, 1939×.
Dolichocarpæ (Pachira), 2424.
Dolichodeira, 3169×; tubiflora, 208.
Dolicholus, 2955×.
Dolichos bulbosus, 2425×; erosus, 2425×; japonicus, 2856×; Lablab, 41×; multiflorus, 3244; palmatiloba, 2426; phaseoloides, 2856×; pruriens, 3244; sesquipedalis, 3469×.
Domba Oil, 636×.
Donaldia ulmifolia, 482.
Dondia, 1425×.
Dondisia, 1425×.
Doodia, 1214×.
Dooja, 2047×.
Doorweed, 2740×.
Dorema Ammoniacum, 62×.
Dorner, Frederick, 1571×.
Doryalis, 172.
Double Coconut, 1899×; -Orange Daisy, 1133; Snowdrop Anemone, 286.
Douglas, Robert, 1572; T. H., 1572.
Douglas Spruce, 2847.
Douglasianæ (Cratægus), 886.
Doura, 1497.
Dove-Flower, 2554; -wood, 244×.
Down Thistle, 2354.
Downer, J. S., 1572.
Downing, A. J., 1572×; Chas., 1573.
Downton Elm, 3412.
Downy Myrtle, 2948; Poplar, 2762; Swamp Blueberry, 3423.
Doxantha capreolata, 503.
Dracæna Boscii, 238×; Draco, 19×; Ehrenbergii, 3531×; filamentosa, 238×; Fintelmanni, 3531×; graminifolia, 1890×; Lenneana, 3531×; Lennei, 3531×; various names, 3588; yuccoides, 3531×.
Dracocephalum canariense, 698×; canescens, 1776×; denticulatum, 2612; virginianum, 2611×.
Dracontium spinosum, 1823×.
Dracunculus crinitus, 1450×.
Dragon Arum, 391×; -Head, False, 2611×; -Root, 392; -Tree, 1069×.
Dreer, H. A., 1573.
Drejera puberula, 1730×; Willdenowiana, 1715.
Drimys aromatica, 3313×; Winteri, 34.
Driveways, 3496×.
Dropseed, 3217×; -wort, 1239; -wort, Water, 2328×.
Drosera rotundifolia, 38×.
Droseraceæ, 38.
Drymophlœus singaporensis, 3571.
Drymosphace (Salvia), 3059×.
Drynaria, 1214×; mussæfolium, 2607×.
Dryopteris, 1214×, 1217; Filix-mas, 8×.
Duchartrea, 1333×.
Duck-Flower, 393×.
Duck's-Meat, 1836×.
Duckweed, 1836×; Family, 18; Tropical, 2650.
Duckwheat, 1201×.
Duc van Thol Tulip, 3398.
Dudaim Melon, 908.
Dudleya Cotyledon, 871; lanceolata, 871; pulverulenta, 870×; Purpusii, 870×.
Dufour, J. J., 1573×.
Dugaldia Hoopesii, 1443×.
Duguetia longifolia, 1306×.
Duke Cherry, 2838.
Duku, 1818×.
Dumb Plant, 1006×.
Duranta Elliaia, 69×.
Durie Caraboa, 398×.
Durio zibethinus, 53, 2301×.
Durra, 1497.
Dusty Miller, 399×, 711, 1928, 3152.
Dutch Case-Knife Bean, 2576; Crocus, 898; Elm, 3411×.
Dutchman's Breeches, 1002; Pipe Family, 28.
Duvaua dependens, 3109.
Dwarf Alder, 1270×; Bilberry, 3424; Blue-Gum, 1154; Cherry, 2833×, 2836×; Dandelion, 1758; Golden Yellow-flowering Pea, 901×; Jamaica, 2078; Palmetto, 3045; Poinciana, 613; Pomegranate, 2862; Squill, 3118; Willow, 3054.
Dyckia Glaziovii, 2121×.
Dyer's Greenweed, 1323; Weed, 2918; Woad, 1688; Woodruff, 411×.

Earflower, 938.
Easter Bell, 3234×; Cactus, 3113×; Daisy, 3361; Flower, 1169×; Lily, 1867×.
East Indian Copal, 1417; Lotus, 2117; Rosebay, 3304×.
Eatonia Dudleyi, 3205×; pennsylvanica, 3205.
Eau-d'ange, 60×; de Creole, 1976.
Ebenaceæ, 65×.
Ebony, 1014×, 2652×; Family, 65×; Mountain, 456×.
Ecballium Elaterium, 76.
Echeveria agavoides, 870; bracteosa, 2425; californica, 871; coccinea, 870×; farinosa, 870×; fulgens, 870; gibbiflora, 870×; lanceolata, 871; metallica, 870×; Peacockii, 870; Purpusii, 870×; rosea, 870×; sanguinea, 870; Scheerii, 870; secunda, 870; secunda var. glauca, 870.
Echinocactus Fiebrigii, 2915; Lewinii, 1915; Pentlandii, 1097×; Poselgerianus, 1978; Sellowii, 1971×; Williamsii, 1915.
Echinocereus tuberosus, 3513.
Echinosphace (Salvia), 3065.
Echinostachys, 221×.
Echites funiformis, 1982×; nutans, 2782×; splendens, 1018.
Echium formosum, 1899×; grandiflorum, 1899×; persæ-tum, 2059; rubrum, 2355; vulgare, 69.
Edelweiss, 1840.
Edraianthus dalmaticus, 3495; Pumilio, 3495; serpyllifolius, 3495.
Edwardsia chilensis, 3192×; chrysophylla, 3192×; grandiflora, 3192; Macnabiana, 3192×; tetraptera, 3192.
Edwinia americana, 1716.
Eeldea, 3278×.
Eel-Grass, 3428.
Egg-Fruit, 1919.
Eggplant, Chinese Scarlet, 3184×; Ethiopian, 3184×; Ornamental, 3184×.
Eglantine, 2990×.
Egyptian Clover, 3379; Onion, 248; Paper Plant, 941; Privet, 1831; Rice Corn, 1497; Willow, 3053.
Eichhornia crassipes, 19.
Elæagnaceæ, 59.
Elæagnus angustifolia, 59, 1440; latifolia, 59; parvifolia, 1440.
Elæis, 2445; guineensis, 16×, 2301×.
Elæocarpaceæ, 51×.
Elæocarpus Family, 51×; sphæricus, 52; tuberculatus, 52.

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Elaterium, 76, 1085; cordifolium, 1085.
Elder, American, 3067×; Box, 204×; European, 3067×; Marsh, 1708; Poison, 2953×; Red-berried, 3068; Sweet, 3067×; Wild, 344×; Yellow, 3317.
Elecampane, 1654×.
Elemi, 1418.
Eleocharis tuberosa, 16.
Elephant-ear Fern, 1108.
Elephant's Ear, 469, 830; Foot, 3322.
Elettaria Cardamomum, 22.
Eleusine ægyptiaca, 950×.
Eleutherococcus Henryi, 193; senticosus, 193.
Elichrysum bicolor, 1449×.
Eliot, Chas., 1573×; Jared, 1573×.
Elliot, Wyman, 1574.
Elliott, F. R., 1574.
Ellisia acuta, 1081.
Ellwanger, Geo., 1574.
Elm, American, 3409×; Belgian, 3412; Camperdown, 3410×; Cedar, 3413; Chinese, 3413; Cork, 3410; Cornish, 3412×; Downton, 3412; Dutch, 3411×; English, 3411; Family, 25×; Guernsey, 3412×; Huntingdon, 3411×; Jersey, 3412×; Red, 3410×; Rock, 3410; Scotch, 3410×; Slippery, 1279, 3140×; Smooth-leaved, 3412; Wahoo, 3410; Water-, 2655×, 3409×; Wheatley, 3412×; White, 3409×; Winged, 3410; Wych, 3410×.
Elodea campanulata, 1632×; canadensis, 14×; virginica, 1632×.
Elymus giganteus, 3568.
Embira, 3526×.
Emblica, 2606.
Embothrium coccineum, 27; speciosissimum, 3320×.
Emerus major, 855×.
Emlic, 2606.
Emory, R. S., 1574.
Empetraceæ, 47×.
Empress of Brazil, 1494.
Empusa muscæ, 5×.
Enalus, 14×.
Enchanter's Nightshade, 773×.
Encholirium Saundersii, 3493.
Enckea, 2646.
Encyclium, 1117×.
Endymion, 3117.
Engelmann Spruce, 2620.
Englerophœnix Maripa, 2016; regia, 2016.
English Blue-Grass, 2723×; Daisy, 485×; Dwarf Bean, 3464×; Elm, 3411; Holly, 1638; Ivy, 1437×; Laurel, 2843×; Oak, 2888; Walnut, 1722.
Ensete edule, 2077.
Enterolobium Saman, 2653, 3066×.
Eopepon vitifolius, 3376.
Epacridaceæ, 64.
Epacris Family, 64.
Epapulosa, 2041.
Ephemerum bicolor, 2950.
Epibaterium carolinum, 808×.
Epidendrum, 2402; bicornutum, 996×; bidentatum, 996×; Hügelianum, 692; Mathewsii, 2105×; Medusæ, 2105×; tibicinis, 3114; triquetrum, 2346×.
Epifagus, 1824×.
Epigynium acuminatum, 3332×.
Epilobium latifolium, 61.
Epimedium diphyllum, 205×.
Epipactis, 1357×; latifolia, 23.
Epiphyllum Gærtneri, 3113×; Russellianum, 3113×; Russellianum var. Gærtneri, 3113×; truncatum, 3550.
Equisetaceæ, 10.
Equisetales, 1208.
Equisetum, 10×.
Eranthemum Andersonii, 2845; bicolor, 951, 2845×; cinnabarinum, 2845; igneum, 733×; laxiflorum, 2845; malaccense, 2845; nervosum, 951; pulchellum, 951, 2845×; reticulatum, 2845×; rubronervum, 1240×; rubrovenium, 1240×; rubrovenosum, 1240; Schomburgkii, 2845×; seticalyx, 2845×; tuberculatum, 2845×.
Eremanthe (Hypericum), 1630×.
Eremurus turkestanicus, 3568.
Eria coronaria, 3376.
Erianthæ (Salvia), 3062×.
Erica spiculifolia, 581; vulgaris, 631×.
Ericaceæ, 64.
Erigeron canadense, 77.
Erinosma vernum, 1849.
Erinus gracilis, 3532×; lychnidea, 3532×.
Eriodendron anfractuosum, 700; occidentale, 700; orientale, 700.
Eriodictyon glutinosum, 69; Parryi, 2097×.
Eriogynia cæspitosa, 2563×; pectinata, 1921.
Eriolobus kansuensis, 2874; yunnensis, 2874.
Eriophorum, 16.
Eriopsis, 2402.
Eriostomum, 3219×.
Eriotrichæ (Potentilla), 2774.
Eritrichium barbigerum, 902×, 1758×; glomeratum, 1758×; nothofulvum, 2655×.
Ernst, A. H., 1574×.
Erodium cicutarium, 245×; moschatum, 43.
Erpetion hederaceum, 3473; petiolare, 3473; reniforme, 3473; spathulatum, 3473.
Ervum Ervilia, 3466; Lens, 41×, 1839.
Eryngo, 1137×.
Erythea, 2445.
Erythræa Centaurium, 67.
Erythrina piscipula, 2648×.
Erythrobalanus, 2883.
Erythrochæte palmatifida, 1858×.
Erythrodes querceticola, 2612.
Erythrospermum hypoleucum, 701×.
Erythroxylaceæ, 44.
Erythroxylon Coca, 44.
Escorzonera, 72×.
Esparcet, 2353.
Esparto, 1934×; -Grass, 3243.
Espino Blanco, 599; Cavan, 188×.
Estragon, 399.
Ethiopian Eggplant, 3184×.
Euagave, 232.
Eualsoonia (Saxifraga), 3096×.
Euasparagus, 406×.
Euatalantia, 426.
Eubatus (Rubus), 3029×.
Eubotrys, 1850×.
Eucalochortus, 632×.
Eucalyptus alba, platyphylla, 3568.
Eucastalia, 2313.
Eucharis Clibranii, 3415×.
Euconvolvulus, 839×.
Euepidendrum, 1118.
Eufortunella, 1269×.
Eufritillaria, 1280.
Eufurcræa, 1305×.
Eugene Poplar, 2760.
Eugenia myriophylla, 514×; operculata, 3302×; Pimenta, 2626; Ugni, 2096×.
Euhypericum, 1632.
Eulalia, 2057; gracillima univittata, 2057×; japonica, 2057×; japonica gracillima, 2057×.
Eulimonium, 3231×.
Eulirion, 1867.
Eumaurandia, 2012×.
Eumelothria, 2033×.
Eumorpha, 2530×.
Eumusa, 2078.
Eumycetes, 5×.
Euonymus. See Evonymus, below.
Eupatorium perfoliatum, 77; serotinum, 3568.
Euphorbia, 46×; canaliculata, 2524×; carinata, 2524×; pendula, 3078; tithymaloides, 2524×.
Euphorbiaceæ, 46×.
Euphorbiodendron, 1173×.
Euphorbium, 1170.
Euphotinia, 2596.
Euphrasia officinalis, 71.
Eupicea, 2618.
Eurhododendron, 2937×.
European Aspen, 2756×; Beech, 1202×; Bird Cherry, 2843; Black Currant, 2959; Cranberry-Bush, 3462×; Elder, 3067×; Evening Primrose, 2329×; Goldenrod, 3188×; Grape, 3484×; Green Alder, 252; Hornbeam, 673×; Larch, 1822×; Mountain-Ash, 3195×; Raspberry, 3028; Turk's-Cap Lily, 1873; White Hellebore, 3440×; Yellow Pond-Lily, 2292.
Eurosa, 2984×.
Eurya microphylla, 1188.
Euryale ferox, 31×, 2302.
Euryangium, 1228.
Eusiphonantha (Limonium), 3232×.
Euspathiphyllum, 3202.
Eusphace (Salvia), 3058×.
Eustachys, 3220.
Eustoma Russellianum, 1890×.
Eusyringa, 3300.
Eutacta, 345.
Eutassa, 345.
Euterpe caribæa, 2405; vinifera, 2846×.
Euthapsi (Verbascum), 3442.
Eutoca divaricata, 2567; glandulosa, 2567×; Menziesii, 2567; mexicana, 2567; multiflora, 2567; viscida, 2566×; Wrangeliana, 2567×.
Euvaccinium, 3424.
Euvitalbæ (Clematis), 796×.
Evans, J. C., 1574×.
Evansia (Iris), 1669.
Evening Campion, 1928×; Primrose, 2328×; Primrose Family, 61; Star, 840.
Everbearing Grape, 3484×; Strawberry, 1273.
Everblooming Cherry, 2837×.
Evergreen Blackberry, 3030×; Cherry, 2844; Grape-Vine, 3482×; Wisteria, 2706×.
Everlasting, 280×, 299; Grape 3484×; Pea, 1825×; Thorn, 2863×; Yellow, 1450.
Evi, 3216×.
Evodia hupehensis, 3568×.
Evonymus japonica, 1440; name of, 3590.
Ewe-gowan, 486.
Exaratæ (Saxifraga), 3091.
Excœcaria Agallocha, 47; sebifera, 3073.
Exocarpus, 27×.
Exogonium Purga, 68×.
Eyebright, 1175.

Faba sativa, 3464×; vulgaris, 3464×.
Fabiana imbricata, 71.
Fadyenia Hookeri, 1316×.
Fagaceæ, 25×.
Fagara, 3537.
Fagopyrum cymosum, 2744; esculentum, 28×.
Fagus grandifolia, 2302; obliqua, 2290; procera, 2290; sylvatica, 1440.
Faham, 23.
Fair Maids of France, 2907×.
Fairy Bells, 1060×; -Grass, Himalaya, 2057×; Lily, 3541×; Primrose, 2795×; Rose, 2988.
Falcata comosa, 278×.
Fallaces (Primula), 2797.
Fall Dandelion, 1840; Grape, 3487.
False Acacia, 2967; Arum Root, 3320×; Bitter-sweet, 701; Chamomile, 520; China Brier, 3175; Dragon-Head, 2611×; Gromwell, 2355; Hellebore, 3440×; Indigo, 275×, 453; Mallow, 1974×; Mitrewort, 3343; Pareira, 775; Saffron, 675; Sandalwood, 3525; Shagbark, 677; Sisal, 232×; Solomon's Seal, 3172×.
Fancy Geranium, 2532×.
Fanwort, 608×.
Farewell-to-Spring, 1353×.
Farfugium grande, 1858×; Kaempferi, 1858×; maculatum, 1859.
Farinosæ (Primula), 2801×.
Farkleberry, 3422.
Fascicularia pitcairniifolia, 2949.
Fatsia horridum, 1096×; papyriferum, 3323×.
Faya fragifera, 2093×.
Feathered Columbine, 3326×; Hyacinth, 2080×.
Featherfoil, 1607×; Geranium, 737; -Grass, 3243.
Feathery Bamboo, 448×.
Fedegosa, 680×.
Fedia rupestris, 2487×.
Fendlera utahensis, 3512×.
Fendlerella utahensis, 3512×.
Fennel, 911×; Dog, 300; Florence, 911×; Flower, 911×, 2145×.
Fenzlia alba, 1337×; dianthiflora, 1337×.
Ferdinanda eminens, 2724.
Fern, Bear's-foot, 1614; Coffee, 2535; Cotton, 2290×; Elephant-ear, 1108; Grape, 3352×; Hartford, 1934×; Holly, 945×; Interrupted, 2413×; King, 2413×; Lace, 735, 2135×, 2290×; -leaved Lily, 1874×; New York, 1079; Palm, 931×; Resurrection, 2744×; Strawberry, 1457×; Wood-, 1078×.
Ferns, 7.
Feronia lucida, 1220.
Ferraria, 3344×.
Ferula canadensis, 1859.
Fescue, Blue, 1228×; -Grass, 1228×; Hard, 1229; Meadow, 1228×; Red, 1228×; Sheep's, 1228×; Tall, 1228×; Various-leaved, 1228×.
Fessenden, T. G., 1575.
Festuca ovina, 15; quadridentata, 15.
Fetid Currant, 2959; Till, 35×.
Fetish-Tree, 1738.
Fetter-Bush, 2622×.
Fetticus, 3427.
Feuillæa pedata, 3320.
Fever Bush, 487; -few, 756; -few, American, 2477×; -Plant, Chinese, 2430×; Tree, 2626×; -wort, 3382×.
Fiber, Gomute, 390; Kapok, 521×; Lechuguilla, 236×.
Ficaria Ficaria, 2906.
Ficus, 26×; dealbata, 871×; sinuosa, 3568×; subtriplinervia, 3417; ulmifolia, 3568×; utilis, 3568×.
Field Balm, 2130×; Pea, 2650×; Sorrel, Common, 3037×.
Fieldia lissochiloides, 3233×.
Fiery Thorn, 2863×.
Fig, Adam's, 2078×; Barberry, 2363; Cluster, 1233; Country, 3077; Creeping, 1231×; Indian, 2361; -Marigold, 2040; Mistletoe, 1232×; Moreton Bay, 1232×; Pharaoh's, 1234; -wort, 3121; -wort Family, 71.
Fiji Arrowroot, 3304×.
Filago germanica, 1335×.
Filaree, 1136×.
Filaria, 2583.
Filicales, 1208.
Filicinæ, 7.
Filmy-Fern Family, 8.
Fine Bent-Grass, 240×.
Finger-Comb Grass, 950×; Grass, 750×; -Lime, 2047; -Lime, Garroway's, 2047×.

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Finocchio, 911×.
Fir, 172; Balm of Gilead, 173×; Balsam, 173×; Red, 174×, 2847; Silver, 173; Spanish, 174×; Summer, 400×; White, 173, 174.
Fire King, 477; -on-the-Mountain, 1170; Pink, 3167; Raspberry, 3024×; -thorn, 2863×; -Weed, 1121.
Firmiana plantanifolia, 3239.
Fish Geranium, 2531; -Grass, 608×; -Poison Tree, 2648×; -tail Palm, 679.
Fischeria Martiana, 1356.
Fistulina hepatica, 2088.
Five-finger, 2771×.
Flacourtia Family, 56.
Flacourtiaceæ, 56.
Flag, Crimson, 3113; Spiral, 864; Sweet, 210×.
Flagellata, 4.
Flame-colored Azalea, 2942; -Flower, 1751×; Tree, 3239×.
Flaming Poppy, 2017×.
Flat Palm, 1612×; Pea, 1825×; Peach, 2833; -topped Yate, 1154×.
Flavæ (Cratægus), 885.
Flax, 1886×; Family, 43×; Flowering, 1886×; Mountain, 2738; New Zealand, 2595; Prairie, 1887×.
Fleabane, 1132×.
Fleece, Mountain, 2742×.
Flexiles (Pinus), 2637.
Floating-Heart, 2315×; Star, 2051.
Floerkea Douglasii, 1882×.
Flomboyant, 2727.
Flooded Gum, 1158.
Floral Fire-Cracker, 558×.
Flora's Paint-Brush, 1112.
Flor de Isabal, 1118×; de la Oreja, 938.
Floribundæ (Primula), 2791.
Florida, 2229; Beggarweed, 991; Moss, 3350×; Olea, 2412×; Smilax, 3174×; Swamp Lily, 893×.
Flos Adonis, 221; indicus, 1220.
Floss Silk Tree, 752.
Flower-Garden, 1747×.
Flowering Almond, 2831×; Apple, Chinese, 2873×; Crab, 2875; Dogwood, 854×; Fern, 2413×; Flax, 1886×; Maple, 176×; Moss, 2878×; Raspberry, 3024×; Rush, 601; Spurge, 1169; Willow, 747×; Wintergreen, 2738.
Flower-of-an-Hour, 1484×; of Jove, 1928; of St. Sebastian, 692; of the Gods, 1020×.
Fluellen, 3452×.
Fluggea suffruticosa, 3125.
Fly Orchis, 2356; -Poison, 3549×.
Flying Dragon, 2752.
Foam-Flower, 3343.
Fœniculum dulce, 911×; vulgare, 62×, 911×.
Forcing-houses, 1400×.
Forefather's Cup, 3078×.
Forest Gray Gum, 1158.
Forget-me-not, 2091; Creeping, 2340×; Giant, 2090×.
Formal Gardens, 1793.
Forsteropsis, 3278×.
Fortunæa sinensis, 2708×.
Fortune's Double Yellow Rose, 2987×; Palm, 3362.
Fo Shu Kan, 781×.
Fothergilla involucrata, 2476×.
Fountain Grass, Crimson, 2537×.
Fouquieria splendens, 55.
Fouquieriaceæ, 55.
Fourcræa, 1305.
Fourcroya, 1305.
Four-leaved Grass, 2474×; -O'clock, 2056×; -O'clock Family, 29×.
Fowl Meadow-Grass, 1352.
Foxberry, 3425; -Brush Orchid, 225×; -glove, 1009×; -glove, Mexican, 3323×; Grape, 3490×; Grape, Southern, 3484; -tail, 1500; -tail Cactus, 1979; -tail, Green, 3158; -tail Pine, 2639×; -tail, Yellow, 3158.
Fragaria indica, 1080.
Fragrant Balm, 2061; Candytuft, 1635×.
Franciscea calycina, 581×; confertiflora, 581×; eximia, 581×; Hopeana, 582; latifolia, 582; pauciflora, 581×; uniflora, 582.
Frangipani, 2723.
Frangula Alnus, 2925; californica var. tomentella, 2924×.
Frankincense, 45×, 1417×; Pine, 2643.
Franklinia alatamaha, 1361.
Fraxinaster, 1276×.
Fraxinella, 1004; alba, 1004×; Dictamnus, 1004×.
Fraxinus americana, 357; Ornus, 66×.
Fremontodendron californicum, 1278×.
French Honeysuckle, 1442; Marigold, 3305; Physic Nut, 1720; Pink, 711×; Sorrel, 3037×; Vetch, 3464×.
Frenela rhomboidea, 631; robusta, 631.
Fresh-water Cord-Grass, 3201; Soldier, 3260.
Freycinetia, 2449.
Fringe, Mountain, 220×; Tree, 748.
Fringed Calla, 392; Galax, 3112; Gentian, 1326; Milkwort, 2738; Polygala, 2738.
Fritillaria Thomsoniana, 1878.
Fritillary, 1279.
Frogbit, 1624; American, 1882×.
Frog's-bit, American, 1882×; Family, 14×.
Frost Flower, 2051; Grape, 3486; Grape, True, 3487; -weed, 1444×.
Fructa de Macaco, 2977×.
Fruit-Growing, history, 1511×.
Fruta da Condessa, 294×; de bomba, 2460×; del Burro, 3526.
Fruticulosæ (Veronica), 3450×.
Fuchsia, California, 3538×; Cape, 2604×; magellanica var. Riccartonii, 3574.
Fuller, A. S., 1575.
Fuller's Teasel, 1020.
Fulton, J. A., 1576.
Fumana, 1444.
Fumaria officinalis, 36.
Fumariaceæ, 36.
Fumigation, 1044×.
Fumitory, Climbing, 220×; Family, 36.
Funifera utilis, 58×.
Funium piliferum, 1306.
Funkia alba, 1604; albo-marginata, 1605; cærulea, 1604×; cordata, 1604; cucullata, 1604×; Fortunei, 1604×; glauca, 1604×; glaucescens, 1604×; grandiflora, 1604×; japonica, 1604, 1605; lanceolata, 1604×; lancifolia, 1605; lancifolia var. undulata, 1605; liliiflora, 1604; longipes, 1605; marginata, 1605; ovata, 1604×; Sieboldiana, 1604×; Sieboldii, 1604×; Sieboldii elatior, 1604×; sinensis, 1604×; sinensis marmorata, 1604×; subcordata, 1604; tardiflora, undulata, 1605.
Furcræa cubensis, 233.
Furcroya, 1305.
Furze, 3407×.
Fusanus, 27×; acuminatus, 2302.
Fustic, 751×.

Galactia pinnata, 454.
Galam Butter, 65×.
Galangal, 22×.
Galatea plicata, 1110.
Galax aphylla, 64; Fringed, 3112.
Galbanum, 63, 1417×.
Gale, Eldridge, 1576.
Gale palustris, 2093×.
Galedupa indica, 2753.
Galega bicolor, 3568×; grandiflora, 3321×.
Galeobdolon luteum, 1777.
Galeorchis (Orchis), 3598.
Galericularia, 3122×.
Galinsoga trilobata, 3378×.
Galium triflorum, 74×; verum, 74×.
Gallicæ (Rosa), 2988×.
Galphimia angustifolia, 3334×; brasiliensis, 3334×; glauca, 3334×; hirsuta, 3334×.
Gama-Grass, 3383×.
Gambir, 74×.
Gamboge, 54×; Tree, 1313.
Gamnoge, 1417×.
Gano, W. G., 1576.
Ganymedes albus, 2110×; concolor, 2110×; nutans, 2110×; pulchellus, 2110×.
Garbanzo, 769.
Garcinia Family, 54×; Mangostana, 54×; Morella, 54×.
Garden architecture, 2675.
Gardener's Garters, 2574.
Gardenia citriodora, 2058×; jasminoides, 1440; macrantha, 2904×; Stanleyana, 2904×; tubiflora, 2419×.
Gardoquia betonicoides, 698×.
Garey, T. A., 1576×.
Garget, 2614.
Garidella, 2145×.
Garland Flower, 1441.
Garlic Pear, 889; Streak-leaved, 2291; Yellow False, 2291.
Garroway's Finger-Lime, 2047×.
Garugandra amorphoides, 1347×.
Gas-Plant, 1004.
Gastonia palmata, 3372×.
Gastronema, 945.
Gaultheria procumbens, 64.
Gaussia princeps, 2445.
Gaywings, 2738.
Geblera suffruticosa, 3125.
Geiger Tree, 842.
Gelsemium sempervirens, 67.
Gemmiferæ (Saxifraga), 3090.
Gemmingia chinensis, 485.
Genetyllis fuchsioides, 965×.
Genip, 2025×.
Genipop, 1322.
Genista Andreana, 948; candicans, 948×; canariensis, 948×; formosa, 948×; Hillebrandtii, 949×; juncea, 3201×; Spachiana, 949×; tinctoria, 42.
Genkwa, 963.
Gentian, 67; Barrel, 1326×; Blind, 1326×; Blue, 1323×; -Blue Gromwell, 1893×; Bottle, 1326×; Closed, 1326×; Family, 67; Fringed, 1326; Horse, 3382×; Soapwort, 1326×; Stemless, 1328.
Gentiana, 67; tibetica, 3568×.
Gentianaceæ, 67.
Gentianella, 1328.
Genuinæ (Limonium), 3231×; (Scutellaria), 3122×; (Stachys), 3220×.
Geodorum plicatum, 2570×.
Geonoma, 2445; glauca, 639×; Ghiesbreghtiana, 639×; magnifica, 639×; Verschaffeltii, 639×.
Georgia, 2226; Bark, 2626×.
Georgina, 951×.
Geraniaceæ, 42×.
Geraniospermum, 2526.
Geranium angulosum, 2532×; Bedding, 2531; Beefsteak, 469; betulinum, 2532; California, 3152×; capitatum; 2533; citriodorum, 3570×; cucullatum, 2532×; dauciifolium, 2529×; denticulatum, 2533×; Family, 42×; Fancy, 2532×; Feather, 737; Fish, 2531; fragrans, 2532; fulgidum, 2529×; graveolens, 2533×; hispidum, 2533×; Horseshoe, 2531; inquinans, 2531×; Ivy-leaved, 2530; Lady Washington, 2532×; Lemon, 2534; Mint, 757; Nutmeg, 2531×; Oak-leaved, 2533; odoratissimum, 2531×; odoratissimum erectum, 2532; pastinacæfolium, 2529×; peltatum, 2530; quercifolium, 2533; Radula, 2533×; revolutum, 2533×; Rose, 2533; Scarlet-flowering Rose, 2533; Show, 2532×; Strawberry, 3093×; triste, 2529×; vitifolium, 2533; Zonal, 2531; zonale, 2531.
Gerardianæ (Pinus), 2639.
German Catchfly, 1928×; Ivy, 3150; Millet, 3158.
Germander, 3324×; Speedwell, 3452×.
Geseneria amabilis, 2097×; cinnabarina, 2097; eriantha, 1706; Family, 72×; pardina, 3433×; regalis, 2097; Regina, 3169×; splendens, 2097; zebrina, 2097.
Gesneriaceæ, 72×.
Gesnouinia, 2474.
Gethyllis lanceolata, 311×.
Gevuina Avellana, 27, 2302.
Gherkin, West Indian, 908×.
Ghost-Weed, 1169.
Giant Arrowhead, 3048×; Bamboo, 3342×; Bell-Flower, 2414×; Daisy, 758; Fennel, 1228; Forget-me-not, 2090×; Groundsel, 3153×; Gum, 1157; Hyssop, 1914×; Milkweed, 637; Prairie Lily, 840×; Reed, 403×; Rye-Grass, 1111×; Siberian Rye-Grass, 3568; Snowdrop, 1309; Spider Plant, 799; Summer Hyacinth, 1312; Yam Vine, 1013×.
Gibb, Chas., 1576×.
Gideon, Peter M., 1577.
Giesleria, 1705×.
Gigartina mamillosa, 5×.
Gilia androsacea, 1883; densiflora, 1842.
Gilibertia paniculata, 2747.
Gill, 2130×; -ale, 2130×; -go-by-the-Ground, 2130×; -over-the-Ground, 2130×; -runover, 2130×.
Gilliflower, 2011×.
Ginger, 3543×; Family, 22; Lily, 1441; Wild, 402, 404.
Gingili-oil, 3157.
Ginkgo biloba, 357, 2302; Family, 11.
Ginkgoaceæ, 11.
Ginseng, 2447×; Family, 62; quinquefolium, 2447×; trifolium, 2447×.
Glabra (Acer), 199×.
Gladiolus gramineus, 2023; indicus, 1220; quadrangularis, 300×.
Gladwin, 1678×.
Glasswort, 3050.
Glaziova insignis, 815×; Martiana, 814×.
Glecoma hederacea, 2130×.
Gleditsia triacanthos, 357, 1440.
Gleichenia, 1214×; Family, 9.
Gleicheniaceæ, 9, 1208×.
Globe Amaranth, 1355; -Flower, 1736×, 3387; Mallow, 3204; Thistle, 1096×; Tulip, 631×.
Globularia Family, 73.
Globulariaceæ, 73.
Glochidion zeylanicum, 2607.
Glomerata (Verbascum), 3443.
Gloneria jasminiflora, 2850×.
Glory-of-the-Snow, 748×; Pea, 802×; Vine, 802×.
Glottidium, 3157.
Gloxinia caulescens, 3169×; rubra, 3169×; speciosa, 3169×; speciosa var. albiflora, 3169×; speciosa var. macrophylla, 3169×; tubiflora, 208.
Glycine floribunda, 3517; frutescens, 3518; hispida, 41×; name of, 3591; sinensis 3517×.
Glycyrrhiza glabra, 42.
Glyptostrobus heterophyllus, 3315; pendulus, 3314×; sinensis, 3314×.
Gnaphalium lanatum, 1450×; Leontopodium, 1840; orientale, 1450; Sieboldianum, 1840×.
Gnetaceæ, 12×.

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Gnetum Family, 12×.
Gnidia carinata, 58×.
Goa Bean, 2849.
Goat-Root, 2353×; Willow, 3053×.
Goat's-Beard, 403, 3365; Rue, 1311, 3321×.
Gobo, 385.
Goethea Makoyana, 2490; multiflora, 2489×; semperflorens, 2490.
Goff, E. S., 1577.
Goiaba, 2848.
Goiabeira, 2848.
Gold Coast Copal, 1417; Dust Tree, 429×; -else, 1897×; Flower, 1631; of Ophir, 2987×; -Star, 1307; Thread, 841.
Golden Alexanders, 3547; Bamboo, 448×; -banded Lily, 1870; -Bell, 1268; -Bells, California, 1112; Calla, 3536; -Chain, 1762×; Club, 2410; Currant, 2958; Dewdrop, 1081; Drop, 2354×; Eardrops, 1002; Early Banana, 2078×; Eggs, 2329×; Feather, 756; Hedgehyssop, 1395; Hop Tree, 2851; Larch, 2845×; Marguerite, 299×; -pert, 1395; Queen, 1897×; Ragwort, 3151×; -rayed Lily, 1870; Saxifrage, 767×; -seal, 1623×; Shower, 680×; Spider Lily, 1934; Stitchwort, 3234×; Thistle, 3120×; -Top, 1776×; -Tuft, 269; Turk's-Cap Lily, 1873; Wattle, 184×; Wattle, Sydney, 187×; Wave, 845×; Wonder Millet, 3158; Yellow Sweet Pea, 901×.
Goldenrod, European, 3188×; Sweet, 3188×; Wreath, 3188.
Goldfussia anisophylla, 3276×; isophylla, 3276×.
Goldilocks, 1886×.
Gomart Resin, 600×.
Gomesa, 2402.
Gomphia cuspidata, 2416×; decorans, 2416×; oliveæformis, 2416×.
Gomphostylæ (Potentilla), 2775.
Gomphrena arborescens, 29×; gnaphaloides, 2566.
Gomuta Fiber, 390.
Gongora, 2402.
Goniocarpa, 1280.
Goniolimon collinum, 3230; elatum, 3230; eximium, 3230; speciosum, 3230; tataricum, 3230; tataricum var. angustifolium, 3230.
Goniophlebium, 1214×.
Goniostema (Euphorbia), 1170.
Gonolobus Cundurango, 2003×.
Gonopyrum americanum, 2740.
Goober, 343×.
Good King Henry, 737.
Goodrich, Chauncey, 1577.
Goodyera Dawsonii, 1427; discolor, 1427; name of, 3591; quercicola, 2612.
Gooseberry, 2956; Barbados, 2547; Cape, 2609; Dwarf Cape, 2609; Gourd, 908×; Hill, 2948; history, 1516; Otaheite, 2606×; Southern, 3422×; Star, 2606×; Swamp, 2960×; West India, 2606×.
Goose-Flower, 393×; -foot, 736×; -foot Family, 29; -Grass, 1109×.
Gopher Plant, 1173×.
Gordonia javanica, 3108×.
Gormania obtusata, 3130; oregana, 3129×.
Gorra, 824.
Gorse, 3407×.
Gourd, 1774×; Dipsaceous, 908×; Dish-cloth, 1921; Family, 75×; Gooseberry, 908×; Hedgehog, 908×; Ostrich-Egg, 908×; Rag, 1921; Serpent, 3376; Snake, 3375×; Wax, 486×; White, 486×.
Goutweed, 223×.
Governor Plum, 1241.
Goyave, 2848.
Goyavier, 2848.
Graemia aromatica, 1443.
Grahamia aromatica, 1443
Grains of Paradise, 274×; of Selim, 3528.
Gramineæ, 14×.
Grammatocarpus volubilis, 3123×.
Grammatophyllum Ellisii, 1371×; Finlaysonianum, 578×.
Granadilla, 2481×, 2483×.
Grandul, 613×.
Grape, American, 2614×; Bird, 3484×; Blue, 3489×; Bull, 3484; Bullace, 3484; Bullit, 3484; Bunch, 3489×; Bush, 3485; Calloosa, 3490; Cañon, 3488; Cat, 3486×; Chicken, 3487; Currant, 3485; European, 3484×; Everbearing, 3484×; Everlasting, 3484×; Fall, 3487; Family, 51; Fern, 3352×; Fox, 3490×; Frost, 3486; history, 1515; June, 3486×; Leather-Leaf, 3490; Mango, 3198×; Mountain, 3485, 3487; Mustang, 3484×, 3490; Pigeon, 3489×; Pine-Wood, 3490; 'Possum, 3487; Raccoon, 3487; Red, 3486×; Riverbank, 3486; Rock, 3485; Sand, 3485; Sea-, 807×; Shore-, 807×; Skunk, 3490×; Southern California, 3488×; Southern Fox, 3483; Spanish, 3487; Sugar, 3485; Summer, 3489×; Sweet Mountain, 3485; Sweet Winter, 3487×; Tail-, 397; True Frost, 3487; Turkey, 3490; Valley, 3488×; -Vine, Evergreen, 3482×; Wine, 3484×; Winter, 3487.
Grass, Barley-, 1500; Billion-Dollar, 1096; Blue Couch, 939×; Bottle-brush, 1634×; Carpet-, 2479×; Cloud-, 241; Coco-, 942×; Colorado-, 2452×; Cow-, 3379×; Crimson Fountain, 2537×; Curly-, 3110×; English Blue-, 2723×; Family, 14×; Fish-, 608×; Fowl Meadow, 1352; Fresh-water Cord-, 3201; Gama-, 3383×; Goose-, 1109×; Gum, 3522; Himalaya Fairy-, 2057×; Indian, 3108×; Khas Khas, 3456; Khus Khus, 3456; Korean Lawn-, 3549; Marsh Spike-, 1061; Melic, 2025×; Millet-, 2050×; Molasses, 2026; Natal-, 3374×; Nut-, 942×; of Parnassus, 2475; Palm-, 2453; Para-, 2453; Pepper-, 1841; Pink, 998×, 1883; Porcupine-, 3242×; Ravenna-, 1129; Reed Meadow-, 1351×; Rhodes, 750×; Ruby-, 3374×; St. Augustine, 3237; St. Lucie, 939×; Salt-, 1061; Scorpion, 2091; Scurvy, 454; Siberian Rye-, Giant, 3568; Silk-, 1306×; Slough-, 3201; Snake-, 1126; Spike-, 991, 3414×; Star, 751, 1634; Stink-, 1126; Sudan-, 1497; Sweet-scented, 1491×; Tape-, 3428; Terrel, 1111×; Tickle-, 1500×; Tree, 3522; Tunis-, 1497; Uva-, 1421×; Velvet-, 2290×, 3549; Wheat-, 240; Whitlow-, 1068; Windmill, 750×; Wire-, 939×, 1109×, Witch-, 2452×; Yard-, 1109×.
Gratiola officinalis, 71.
Gravesia guttata var. margaritacea, 3056×.
Graveyard-Flower, 2723.
Graviola, 292.
Gray Agave, 232×; Cranesbill, 1331; Gum, Forest, 1158; Poplar, 2756.
Great Bulrush, 3119×; Hedge Bedstraw, 1312; Laurel, 2941; Mogul, 892; Plains Cottonwood, 2759×; Water-Dock, 3037; Willow-Herb, 1121.
Greek Valerian, 2729×.
Green Agave, 232×; Alder, American, 252×; Alder, European, 252; Aloe, 1306; Ash, 1275×; -banded Mariposa Lily, 635; Fox-tail, 3158; -heart Wood, 35×; Rose, 2988; Wattle, 188.
Green, Samuel B., 1577×.
Greenhouses, history, 1518×.
Gregoria Vitaliana, 1067×.
Gregory, J. J. H., 1578.
Grenadine, 999×.
Grevillea robusta, 27.
Grewia asiatica, 52.
Grias cauliflora, 59×.
Grisebachia Belmoreana, 1612×; Forsteriana, 1612×.
Grizzly-Bear Opuntia, 2363.
Gromwell, 1893; False, 2355; Gentian-Blue, 1893×.
Grossularia curvata, 2961; Cynosbati, 2962; divaricata, 2961×; hirtella, 2961; inermis, 2961×; Lobbii, 2962×; missouriensis, 2961; nivea, 2960×; oxyacanthoides, 2961; pinetorum, 2962×; reclinata, 2961×; Roezlii, 2962×; rotundifolia, 2961×; setosa, 2961; speciosa, 2963.
Ground Cherry, 2836×, 2608; -Hele, 3452×; Ivy, 2130×; Lily, 3380×; -Nut, 310×, 2447×; -Pine, 1932; Pink, 2589×.
Groundsel, 3148×; Giant, 3153×; Tree, 440×; Velvet, 3152×.
Gru-gru, 211×.
Grumilea capensis, 2850.
Grumixameira, 1162×.
Guacima, 1415×; Maria, 3526×.
Guadaloupe Palm, 1140×.
Guaiacum officinale, 44.
Guam, 1696.
Guanábana, 292; Cimarrona, 292×.
Guapilla, 239.
Guatemala Rhubarb, 1720.
Guava, Brasilian, 2848×; Costa Rican, 2848; Pineapple, 1204×; Strawberry, 2848×; Ugni, or Chilean, 2096×; Yellow Strawberry, 2848×.
Guavica, 3527×.
Guavico de Savana, 3527×.
Guayaba, 2848; Acida, 2848.
Guayabota, 1016.
Guaymochil, Tamarind, 2652.
Guayote, 1356.
Guayule Rubber, 2477×.
Guelder Rose, 3462×.
Guernsey Elm, 3412×; Lily, 2137.
Guiana Plum, 1080.
Guilandina, 612×; Bonduc, 2302.
Guilielma speciosa, 441; utilis, 441×.
Guimba, 3527×.
Guinea Corn, 1497; -Grass, 2452×; -hen Weed, 2562×; Pepper, 3528; Squash, 1101×, 3182×.
Guisaro, 2848; Sour, 2848.
Guisotia abyssinica, 77×.
Gujava, 2848.
Gujavabaum, 2848.
Gum, Angico, 2647; Apple-scented, 1157; Arabic, 178×, 1417; Arabic Tree, 188×; Black, 2316×; Blue, 1153×; chicle, 65×; Cider, 1158×; Cotton, 2317; Desert, 1156×; Flooded, 1158; Forest Gray, 1158; Giant, 1157; Grass, 3522; Hickory, 1155×; Honey-scented, 1158×; Kawri, 230×; Lemon-scented, 1152×; Manna, 1156×; Mountain, 1155; Myrtle, 288×; Peppermint, 1157; -Plant, 1414; Red, 1158; Sour, 2316×; Spotted, 1152×; Sugar, 1157×; Swamp, 1158×; Sweet, 1889×; Tallow-wood, 1155×; Tree, 631, 1148.
Gumbo, 1485×.
Gumbolimbo, 600×.
Gumi, 1106.
Gunnera chilensis, 62; macrophylla, 62.
Gustavia gracillima, 1716×; insignis, 1716×; pterocarpa, 1716×; speciosa, 1716; superba, 1716×.
Gutta-percha, 65×; -Tree, 1706×.
Guttiferæ, 54×.
Guzmania fragrans, 653×; Legrelliana, 1496; mussaica, 2010×; picta, 388×, 2144×; Zahnii, 3351×.
Gynerium arcuato-nebulosum, 856×; argenteum, 856×; jubatum, 856×; Quila, 856×.
Gymnema lactiferum, 68.
Gymnocarpæ (Potentilla), 2773×.
Gymnadenia conopea, 1423; conopsea, 1423; odoratissima, 1423×.
Gymnogramma argyrophylla, 726; aurea, 725×; calomelanos, 725×; chrysophylla, 725×; decomposita, 725×; Ehrenbergiana, 1420×; elegantissima, 298×; Feei, 3142×; hispida, 1420×; Laucheana, 725×; peruviana, 725×; schizophylla, 298×; sulphurea, 725×; tatarica, 726; triangularis, 725×; Wettenhalliana, 726.
Gymnolomia uniserialis, 3120.
Gymnopsis uniserialis, 3120.
Gymnostachyum gigantea, 1240×; Pearcei, 1240×; Verschaffeltii, 1240×.
Gymnothrix caudata, 2537×; japonica, 2537×; latifolia, 2537×; macrostachys, 2537×.
Gymnothyrsus (Alnus), 252×.
Gynandriris (Iris), 1682.
Gynocardia odorata, 56×.

Habenaria, 2402×; bifolia, 23; conopsea, 23; macrandra, 2724.
Habranthus, 1492.
Habrothamnus, elegans 726×; Newelli, 727.
Habzelia æthiopica, 3528; aromatica, 3527×; discreta, 3527; obtusifolia, 3527×.
Hackmatack, 1823.
Hæmadictyon venosum, 2782×.
Hæmanthus ciliaris, 599×; toxicarius, 599×.
Hæmatoxylin, 42.
Hæmatoxylon campechianum, 42.
Hagenia abyssinica, 41.
Hahnia Aria, 3197; suecica, 3197.
Hairbell, 649×.
Hair-Grass, 241, 242; Tufted, 988×; Wood, 989.
Hairy Arum, 1450×; Blueberry, 3424; Vetch, 3466; Wattle, 187×.
Hakana, 1919.
Halesia corymbosa, 2855×; hispida, 2855×.
Halfa, 3243.
Halimium canadense, 1444×.
Hall, G. R., 1578.
Haloragidaceæ, 61×.
Hamamelidaceæ, 40.
Hamamelis chinensis, 1916×.
Handflower Tree, 749×.
Haplophyllum Patavium, 3041×.
Haploxylon, 2634×.
Harbinger-of-Spring, 1132×.
Harb Selim, 3528.
Hard Fescue, 1229; -fleshed Cherry, 2838; -hack, 3215; -heads, 712×.
Hardy Pampas-Grass, 1129.
Harebell, 642, 3117.
Hare's-tail Grass, 1776.
Haricot, 2576×.

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Harina caryotoides, 3500×.
Hariota mesembrianthemoides, 2930; Saglionis, 2929×; salicornioides, 1433.
Harison's Yellow Rose, 2995×.
Harpagophytum procumbens, 72.
Harpalium, 1445×.
Harrimanella hypnoides, 681.
Harris, John S., 1578.
Hartford Fern, 1934×.
Hartmannia rosea, 2332; speciosa, 2331×; tetraptera, 2332.
Hart's Choice, 2078×; -Thorn, 2924; Tongue, 2607.
Hashish, 26×.
Hassock-Grass, 988×.
Hatchet Cactus, 2534; -lobed, Rollinia, 2975.
Hat-Palm, Porto Rico, 3044×.
Hautbois, 1273.
Hawaiian Bitter Yam, 1013×; Islands, 1692.
Haw, Apple, 884×; Black, 3459×; May, 884×.
Hawkweed, 1490×; Mouse-ear, 1491; Orange, 1491; Shaggy, 1491; White, 1491.
Haworthia aspera, 309×; foliolosa, 310×; imbricata, 310; pentagona, 310; spirella, 310×;
Hawthorn, Indian, 2911; Water, 311×.
Hayhofe, 2130×.
Haymaids, 2130×.
Hazel, Chile, 1335.
Heal-All, 581.
Heart-leaved Willow, 3054×; or Gean Cherry, 2838; -Pea, 661×; -s'ease, 3474×; -Seed, 661×.
Heath, Heather, 1129; Cornish, 1130×; Corsican, 1131; Cross-leaved, 1130×; Family, 64; Irish, 950; Mountain, 2607; Spanish, 1131.
Heather, 631×; Beach, 1613; Bell, 1130×.
Hebe (Veronica), 3453×.
Hebeclinium atrorubens, ianthinum, macrophyllum, megalophyllum, Urolepis, 1165.
Hedeoma pulegioides, 70.
Hedera Helix, 62×; japonica, 987×.
Hedge Cactus, 723; -hog Gourd, 908×; -hyssop, Golden, 1395; -maids, 2130×.
Hedionda, 680×.
Hedræanthus, 3495.
Hedychium Horsfieldii, 538×.
Hedysarum coronarium, 41×; Onobrychis, 2353; tuberosum, 2856×.
Hedyscepe Canterburyana, 2445.
Heeria elegans, 1480, 3111×; procumbens, 1480, 3111×; rosea, 1480; subtriplinervia, 1480.
Heikes, W. F., 1578×.
Helenium aromaticum, 3574; Douglasii, 2063.
Heleocharis, 1109.
Helianthus annuus, 77×; speciosus, 3352; tuberosus, 77×.
Helichrysum angustifolium, 3568×; proliferum, 2569.
Helicodea Baraquiniana, 503×.
Heliconiopeis, 1451.
Helicteres apetala, 3239.
Heliopsis helianthoides var. Pitcheriana, 3574.
Heliosperma, 3163×.
Heliotrope, Garden, 3426×; Tree, 1104×; Winter, 2562.
Heliotropium europæum, 69.
Hellebore, American White, 3440×; European White, 3440×; False, 3440×.
Helleborus hyemalis, 1127.
Helonias asphodeloides, 3524×; bracteata, 3549; bullata, 19×; glaberrima, 3549×; læta, 3549×.
Helwingia rusciflora, 63.
Hemerocallis alba, 1604; plantaginea, 1604.
Hemionitis, 1214×.
Hemiptelea Davidii, 3541.
Hemisphace (Salvia), 3065×.
Hemitelia, 1209×, 1210, 1214×.
Hemlock, Carolina, 3391×; Com., 3391×; Spruce, 3390×.
Hemp, 657×; Agrimony, 1164; Bowstring, 3070; Indian, 311; Manila, 171, 2078; Mauritius, 1306; Mediterranean, 1306; Nettle, 1311; Sisal, 232×; Sunn, 901×; Tampico, 1478; -Tree, 3481; -weed, Climbing, 2050.
Hemsleyna, 3334×.
Hen-and-Chickens, 3145; -bane, 70×, 1628×.
Henderson, Peter, 1578×.
Henequen, 232×, 1305×.
Henfreya scandens, 426.
Henna, 59, 1830×.
Hepaticæ, 6.
Hepburn, David, 1579.
Heptapleurum polybotryum, 3108×; venulosum, 3108×.
Herba impia, 1335×.
Herb-Christopher, 212; Margaret, 486; of Grace, 3041×; -Paris, 2474; Patience, 3036×; Robert, 1331.
Hercules' Club, 344; Club Gourd, 1774×.
Herd's-Grass, 2585.
Hermesias, 580×.
Hermione primulina, 2112×.
Herniary, 1477×.
Heron's-Bill, 1136×.
Hesperis matronalis, 36×.
Hesperomeles, 2414×.
Hesperopeuce Pattoniana, 3392.
Heteranthesia, 3122.
Heterisia Mertensiana, 3093×.
Heterocentron elegans, 3111×.
Heteroconteæ, 4.
Heterolæna decussata, 2625×.
Heteromeles arbutifolia, 2596×; salicifolia, 2596×.
Heterosphace (Salvia), 3065.
Hevea guyanensis, 47.
Hexacentris coccinea, 3339×; lutea, 3339×; mysorensis, 3339.
Hexamer, F. M., 1579×.
Hexapetalæ (Clematis), 797×.
Hexastylis, 403×.
Heyderia, 1854.
Hibiscus, 52×; californicus, 3574; cruentus, 3568×; Lambertianus, 3569; lasiocarpus var. californicus, 3574; syriacus, 1440.
Hiccup-Nut, 2729.
Hickory, Big-bud, 677×; Big Shellbark-, 678; Bottom Shellbark-, 678; Gum, 1155×; Little Shellbark-, 678; Mountain, 184; Nutmeg-, 676×; Pine, 2639×; Swamp-, 676×; Two-veined, 185×; Water-, 676×.
Hicori, 1915.
Hicoria acuminata, 678; alba, 677×; aquatica, 676×; borealis, 677×; carolinæ-septentrionalis, 678×; glabra, 676×; glabra var. microcarpa, 677; glabra var. odorata, 677; glabra var. villosa, 677×; laciniosa, 678; microcarpa, 677; minima, 676×; myristicæformis, 676×; ovata, 678; pallida, 677×; Pecan, 676; texana, 678×; villosa, 677×.
Hiculi, 1915.
Hierochloë odorata, 15.
Hiester, Gabriel, 1580.
Higginsia, 1495×.
High-Bush Blueberry, 3423; Cranberry, 3463; -Water Shrub, 1708.
Hill-Gooseberry, 2948.
Himalaya Fairy-Grass, 2057×.
Himalayan Musk Rose, 2985×.
Himantoglossum hircinum, 2403×.
Hindsia longiflora, 2980.
Hinoki Cypress, 731.
Hippocastanaceæ, 50.
Hippocastanum (Æsculus), 226×.
Hipposelinum Levisticum, 1851.
Hirculus (Saxifraga), 3094.
Hiryo, 2752.
Hisingera racemosa, 3528×.
Ho, 1915.
Hoarhound, 911×, 2003.
Hoary Pea, 3321×; Willow, 3054×.
Hobble-Bush, 3460×.
Hog Millet, 2452×; Peanut, 278×; Plum, 2829, 3217, 3525.
Hogg, Thomas, 1580.
Hohenbergia, 221×; capitata, 1395.
Hoibrenkia formosa, 3227.
Holboellia chinensis, 3170; cuneata, 3078×.
Holcus lanatus, 2290×.
Holly, 1637; American, 1639×; English, 1638; Family, 48×; Fern, 945×, 2749; Mountain, 2120, 2844; Oak, 2889×.
Hollyhock, Antwerp, 268×; Trailing, 1484×.
Holm Oak, 2889×.
Hologymne glabrata, 1823×.
Holophyllæ (Saxifraga), 3088×.
Holy Clover, 2353; -Ghost-Flower, 2554; -Grass, 1491×; Thistle, 3169.
Homeria collina, 21.
Homoglossum, 1343.
Homoioceltis aspera, 308; japonica, 308.
Honesty, 1921×.
Honey-Bell, 1970; Locust, 1346×; Mangrove, 436; Palm, 1721; -scented Gum, 1158×; -wort, 725.
Honeysuckle, 1904; African, 1430; Cape, 3318; Family, 74×; French, 1442; Jamaica, 2484; New Zealand, 265×; Trumpet-, 651×, 1911; White Swamp, 2942.
Hongkong Wild Kumquat, 1270.
Honorine Jobert, 286×.
Hon-toi-moi, 270.
Hookera californica, 577×; coronaria, 577; filifolia, 577×; minor, 577×; Orcuttii, 577×; rosea, 577×; stellaris, 577×; terrestris, 577.
Hoopes, Josiah, 1580.
Hoopkoop, 1845.
Hoop-petticoat Daffodil, 2109; Pine, 346.
Hop, 1614×; -Clover, 3379; -Clover, Low, 3379; Hornbeam, 2415; Medick, 2019×; Tree, 2850×; Trec, Golden, 2851.
Hopea, 3295×.
Hoplophytum augustum, 1496; calyculatum, 222; Lindenii, 222.
Horehound, 2003.
Horkelia Gordonii, 2776.
Horminum (Salvia), 3060.
Hornbeam, 673; American, 673; European, 673×; Hop, 2415; Maple, 201×.
Horned Pondweed, 3534; Poppy, 1346; Rampion, 2612; Violet, 3474.
Horse-Balm, 829×; Bean, 3464×; -Brier, 3174; -Chestnut, 226; -Chestnut Family, 50; -Chestnut, Japanese, 227; Gentian, 3382×; -Mint, 2060×; -Radish Tree, 2067×; -shoe Geranium, 2531; Sugar, 3296; -tail Family, 10; -Weed, 829×.
Horta, 786.
Hortulana Plum, 2828×.
Hose-in-hose, 2055×.
Hoskins, T. H., 1580×.
Hosta, various combinations, 3574.
Hoteia barbata, 423; chinensis, 423; japonica, 423.
Hottentot Cherry, 681, 2013.
Hottentot's Bread, 3322.
Houlettia, 2402×; vittata, 2737×.
Houseleek, 869×, 3143; Cobweb, 3146; Spider-web, 3146.
Houttea pardina, 3433×.
Houttuynia californica, 287×.
Hove, 2130×.
Hovey, C. M., 1580×.
Howea, 2445.
Hoya campanulata, 2612.
Huajillo, 2653.
Huamuchil Tamarind, 2652
Huanhuan Tree, 1827.
Huatari, 1915.
Huckleberry, 1319×, 1320 Garden, 3182×; Squaw 3422.
Hugelia, 1335×.
Huisache, 188×.
Huitsmamaxalli, 599.
Hulthemia, 2984×.
Humble Plant, 2053×.
Humming-bird's Trumpet 3538×.
Hungarian Clover, 3379; Grass, 3158.
Hunnewell, H. H., 1581.
Hunter's-Nut, 2340.
Huntingdon Elm, 3411×.
Huntleya violacea, 519×.
Huntaman's Cup, 3078×.
Hura crepitans, 47.
Husk Tomato, 2608.
Husmann, Geo., 1581.
Hyacinth Bean, 1065; Feathered, 2080×; Giant Summer, 1312; Musk, 2080×; Nutmeg, 2080×; of Peru, 3117×; Squill, 3118; Star, 3118×; Starry, 3117×; Water, 1105; Wild, 3116.
Hyacinthus candicans, 1312; nonscriptus, 3117.
Hyalolepideæ (Limonium), 3232.
Hybanthus ipecacuanha, 56.
Hydnum, 2088.
Hydrastis carolinensis, 3372.
Hydriastele Wendlandiana, 2445.
Hydrocallis (Nymphæa), 2315×.
Hydrocaryaceæ, 61×.
Hydrocharis Spongia, 1882×.
Hydrocharitaceæ, 14×.
Hydrolea urens, 3513.
Hydromystria stolonifera, 1882×.
Hydrophyllaceæ, 68×.
Hydrophyllum canadense, 69; lineare, 2567.
Hydrosme Leopoldiana, 276×.
Hyena Poison, 1618.
Hylogne, 3320×.
Hymenodium, 1108.
Hymenolobus, 1615×.
Hymenophyllaceæ, 8, 1208×.
Hymenophyllum, 1214×.
Hymenosphace (Salvia), 3059.
Hyophorbe, 2445; Commersoniana, 753; indica, 753.
Hyoscyamus niger, 70×; Scopolia, 3120×.
Hyospathe elata, 2623; pubigera, 2782.
Hypericaceæ, 54×.
Hyphæne crinita, 2302; Schatan, 2445.
Hypnum triquetrum, 7.
Hypocrite Plant, 1170.
Hypolepis, 1215; californica, 735; meifolia, 735.
Hypolytrum Pandanophyllum, 1994.
Hyssop, 911×; Giant, 1914×.
Hyssopus Lophanthus, 1914×; officinalis, 911×.

Iberian Cranesbill, 1331×.
Iberis jucunda, 229.
Iboza riparia, 2072.
Icaco, 766×.
Icacorea paniculata, 387×.
Iceland Poppy, 2459×.
Ice-Plant, 2042×; Family, 30; New Zealand, 3323.
Ichthyomethia piscipula, 2648×.
Idæobatus (Rubus), 2026.
Idaho, 2257×.
Ifit, 229.
Ilama, 293×.
Ilamatzapotl, 293×.
Ilangilang, 652×.
Ilex Aquifolium, 48×, 1440; crenata, 1440; gongonha, 3470; opaca, 48×, 1440; Orixa, 2407; paraguariensis, 48×.

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Ilicoides mucronata, 2120.
Illicium anisatum, 34; verum, 34.
Illinois, 2182.
Illipe butyracea, 65×.
Ill-scented Sumac, 2953.
Imantophyllum Aitoni, 804×; cyrtanthiflorum, 804×; miniatum, 804×.
Imbricaria coriacea, 2056×.
Imbu, 3217.
Immortelle, 3495×.
Impatiens, 51.
Imperata sacchriflora, 2057×.
Imperialis coronata, 1282.
Implements, 1939×.
Inarching, 1370×.
Incense Cedar, 1854.
India Rubber, 47; Rubber Plant, 1232; -Wheat, 1201×.
Indian Almond, 3321×; Amulet Plant, 2862×; Bean, 684×; Bread-root, 2849×; Cherry, 2924×; Cucumber-Root, 2019; Cup, 3169; Currant, 3293; Fig, 2361; Grass, 3198×; Hawthorn, 2911; Hemp, 311; Mulberry, 2067×; Paint, 1893×; Pink, 1898×, 2879; -Pipe Family, 63×; Pitcher-Plant, 3078×; Poke, 3440×; Potato, 1448×; Rice, 3546×; Satinwood, 751×; Shot, 656×; Tobacco, 1899; Tree Spurge, 1170; Turnip, 391×, 392; Walnut, 245×.
Indiana, 2179.
Indicæ (Rosa), 2987.
Indigo, 42; Bastard, 275×; False, 275×, 453; West Indian, 1646×; Wild, 453×.
Indigofera tinctoria, 42.
Indivisa (Acer), 201×.
Infrarosulares (Stachys), 3220×.
Inga angulata, 2652×; dulcis, 2652; fragrans, 2653; guadalupensis, 2652; latifolia, 2653.
Inkberry, 1640×.
Innocence, 1611.
Inocarpus edulis, 2302.
Inodes Blackburniana, 3044×; causiarum, 3044×; exul, 3044×; Palmetto, 3044×; texana, 3044×; uresana, 3044.
Inside-out Flower, 3429.
Insignes (Pinus), 2643.
Integrifolia (Acer), 201×.
Intermediate Stock, 2012.
Interrupted Fern, 2413×.
Intricatæ (Cratægus), 883.
Inula Helenium, 77; montana, 3569.
Ionidium concolor, 1618.
Ionoxalis Deppei, 2418×; lasiandra, 2418×; Martiana, 2418×; tetraphylla, 2418×.
Iowa, 2193×.
Ipecac, 714; American, 1338; Emetic, 74×; Spurge, 1169×.
Ipecacuanha, White, 56.
Ipomœa Batatas, 68×; Bona-nox, 635×; Childsii, 635; coccinea, 2879×; coccinea var. hederifolia, 2879×; coccinea var. lutea, 2879×; Funis, 2879×; grandiflora, 635×; hederifolia, 2879×; luteola, 2879×; mexicana, 636; muricata, 636; noctiflora, 636; noctiphyton, 636; Pes-capræ, 68×; Quamoclit, 2879; splendens, 3566; Star, 2879×; tastense, 636; versicolor, 2879×.
Ipomopsis aurantiaca, 1337; elegans, 1337; sanguinea, 1337.
Iriartea andicola, 726; Klopstockia, 726.
Iridaceæ, 21.
Iris, 21; Family, 21; gracilipes, 3569; Mourning, 1477; Pavonia, 2066; Robinsoniana, 2066×; Snake's Head, 1477; tuberosa, 1477; villosa, 2066; Wedding, 2066×; Widow, 1477.
Irish Heath, 950; Moss, 5×.
Ironbark, Broad-leaved, 1152×; Narrow-leaved, 1153; Red, 1153, 1159; Silver-leaved, 1152×; White, 1153, 1159.
Ironweed, 3447.
Ironwood, 599, 1935, 2051, 2339, 2476×, 3221×; Red, 2922×.
Isatis tinctoria, 36×.
Ischarum Pyramii, 500.
Ischnosiphon smaragdinum, 2063.
Isika (Lonicera), 1907.
Islands Cherry, 2844.
Islay, 2844.
Ismene calathina, 1627×; Macleana, 1627×.
Isnardia palustris, 1920.
Isolepis gracilis, 3120.
Isolirion, 1875×.
Isoloma Warszewiczii, 3115×.
Isotypus onoseroides, 2354×.
Isoxylosteum, 1906×.
Italian Corn Salad, 3427×; Cypress, 915; Jasmine, 1718×; Plum, 2825×; Poplar, 2758×; Poplar, Black, 2761×; Rye-Grass, 1902×; Squill, 3118×.
Ita Palm, 2013.
Ivesia Gordonii, 2776.
Ivory-Nut Palm, 2612.
Ivy, Boston, 2478×; Cape, 3150; English, 1437×; German, 3150; Ground, 2130×; Japanese, 2478×; Kenilworth, 1883×; -leaved Geraniums, 2530; Marine, 776; Poison, 2953×.
Ixia chinensis, 485; corymbosa, 1821.
Ixora caffra, 2489.
Ixtle, 236×.

Jaborandi, 2623×.
Jaca, 402.
Jacana, 1919.
Jacaranda Copaia, 72.
Jacinth, Japanese, 3118×; Peruvian, 3117×; Spanish, 3117×.
Jack-Fruit or Tree, 402; -in-a-Box, 1477; -in-the-Pulpit, 392; Oak, 2885; Pea, 653; Pine, 2644.
Jack, Mrs. A. L., 1581×.
Jacobæa elegans, 3150×; macrophylla, 3150×.
Jacobæan Lily, 3218.
Jacobinia ciliata, 997.
Jacob's Ladder, 2729×; Staff, 1271.
Jaeger, Herman, 1581×.
Jalap, 30, 68×, 1660.
Jamaica Dogwood, 2648×; Honeysuckle, 2484; Sorrel, 1485.
Jambolan, 1163×; Plum, 1163×.
Jambos, 1163.
Jambosa caryophyllus, 60×, 1163×; Jambos, 1163; malaccensis, 60×, 1163×; myrtifolia, 1163; vulgaris, 60×, 1163.
Jamestown Weed, 970×.
Jamrosade, 1163.
Jancæa Heldreichii, 2904.
Janipha Manihot, 1991×.
Jankæa Heldreichii, 2904.
Japan Clover, 1845; Maple, 200; Pagoda Tree, 3191×; Poplar, 2763×; Quince, 728; Wood-oil Tree, 245×.
Japanese Apricot, 2824×; Artichoke, 3220×; Banana, 2078×; Barnyard Millet, 1096; Bellflower, 2711; Black Pine, 2642; Easter Lily, 1867×; Flowering Cherry, 2838, 2840; Garden, 1789×; Horse-Chestnut, 227; Iris, 1679; Ivy, 2478×; Jacinth, 3118×; Millet, 3158; Mint, 2035×; Pear, 2869; Pepper, 2646×; Pittosporum, 2654; Plum, 2826×; Raisin Tree, 1611×; Red Pine, 2640; Rose, 1736×; Snowball, 3461; Turk's-Cap Lily, 1873; Varnish Tree, 3239; Weeping Rose-flowered Cherry, 2841; Wisteria, 3517.
Japonica, 728.
Jarrah, 1159.
Jasmine, 1716×; Arabian, 1717; Cape, 1315×; Catalonian, 1718×; Chilean, 1982×; Crape, 3304; Italian, 1718×; Native, 2964×; Night, 2305×; Rock, 282×; Royal, 1718×; Spanish, 1718×; Star, 3361×; West Indian Red, 2723.
Jateorhiza palmatus, 33×.
Jatropha carthaginensis, 1992; Curcas, 46×, 47, 2302; dulcis, 1992; Manihot, 1991×; officinalis, 46×; palmata, 1991×.
Jatrorrhiza, 1719×.
Jaumea, 1751×.
Jeffrey's Pine, 2642×.
Jejerecou, 3526×.
Jelinjoche, 2423.
Jenkinsonia, 2530.
Jequirity, 42.
Jericho, Rose of, 2920.
Jersey Elm, 3412×; Pine, 2644.
Jerusalem Artichoke, 1449; Cherry, 3183; Corn, 1497; Cross, 1927×; Oak, 737; Sage, 2585×; Thorn, 2436×, 2475.
Jessamine, 1716×; African, 3361×; Carolina Yellow, 1321×; Confederate, 3361×; Malayan, 3361×; Night-blooming, 727; Orange, 729, 2076.
Jesuit's Bark, 770; -Nut, 3371×.
Jew Bush, 2524×.
Jewel-weed, 1642×.
Jews' Mallow, 841×.
Jicama, 2425×.
Jimbling, 2606×.
Jimson Weed, 970×.
Jobo, 3217.
Job's Tears, 824.
Joe-Pye Weed, 1164.
Johnson-Grass, 1497.
Jointed Charlock, 2910.
Jointweed, 2740.
Jojoba, 3169×.
Jonquil, Campernelle, 2111.
Jonquilla minor, 2112×.
Joseph's Coat, 270.
Joshua Tree, 3530.
Journals, 1559.
Jovellana violacea, 627.
Juania australis, 2444.
Jubæa, 2445; spectabilis, 2302×.
Judas Tree, 720.
Juglandaceæ, 25.
Juglans, 25; obcordata, 677; ovalis, 677; Pecan, 676; porcina var. obcordata, 677; spp., 2302×.
Jujube, 3547.
Jumping Beans, 829; Mexican, 3124.
Juncaceæ, 19.
Juncoides niveum, 1924; sylvaticum, 1924.
Juncus zebrinus, 3119×.
Juneberry, 272; Grape, 3486×; -Grass, 2723×.
Jungermanniales, 6×.
Jungia (Salvia), 3062.
Juniperus chinensis var. japonica, 3569; chinensis var. japonica aurea, 3569; chinensis var. japonica aureo-variegata, 3569; chinensis var. procumbens, 3569; chinensis var. procumbens aurea, 3569; chinensis var. procumbens aureo-variegata, 3569; chinensis var. Sargentii, 3569; japonica, 3569; japonica chinensis var. 3569; procumbens, 3569; Sanderi, 731, 2922; virginiana, 1440.
Juno (Iris), 1679.
Jupiter's Beard, 303×, 713×.
Jussieua pilosa, 61.
Justicia atramentaria, 1715; carnea, 1714×; coccinea, 1714×; cristata, 309; flava, 3107×; flavicoma, 3107×; gangetica, 426; Gendarussa, 73×; Ghiesbreghtiana, 1715; Lindenii, 1715×; magnifica, 1714×; Mohintli, 1715; pectoralis, 73×, 997; picta, 1393; secunda, 997; speciosa, 2554×; spicigera, 1715; tetragona, 309; thyrsiflora, 2585×; velutina, 1714×.
Jute, 841×; Bilipitam, 1485.

Kabschia (Saxifraga), 3099.
Kafir Bread, 1113; Corn, 1497; Plum, 1432.
Kaki, 1015.
Kale, Roman, 496×.
Kalmiella hirsuta, 1735.
Kalopanax ricinifolius, 192×.
Kaloxanthes coccinea, 2969.
Kamala, 47; Dye, 1972×.
Kamassi Wood, 1346.
Kamila Tree, 1972×.
Kangaroo Thorn, 182; Vine, 776×.
Kansas, 2207×.
Kapok, 637, 700; Fiber, 521×.
Karatas amazonica, 653×; Binotii, 388×; Carolinæ 388×; Innocentii, 2144×; Meyendorfii, 388×; Morreniana, 338×; neglecta, 2144×; princeps, 388×; Scheremetiewii, 2144×; spectabilis, 388×; tristis, 388×.
Karo, 2653×.
Karoub, 717×.
Karri, 1157×.
Kaukenia Kauki, 2056.
Kaulfussia amelloides, 734.
Kauri Copal, 1417; Resin, 22×.
Kava, 2646×; -kava, 24.
Kavista Batu, 1220.
Kawri Gum, 230×; Pine, 230×.
Keffersteinia, 2811.
Kei Apple, 172.
Keibi-ran, 244×.
Kekuna oil, 245.
Kelun oil, 245.
Kenilworth Ivy, 1883×.
Kennedya Comptoniana, 1432; cordata, 1432; longiracemosa, 1432; macrophylla, 1432; monophylla, 1432; ovata, 1432.
Kennicott, John A., 1582.
Kenrick, Wm., 1582.
Kentia Baueri, 2950; Belmoreana, 1612×; Canterburyana, 1442×; divaricata, 1736×; elegans, 943; Exorrhiza, 1195; Forsteriana, 1612×; fulcita, 943; Lindenii, 1736×; Luciani, 1736×; monostachya, 441×; Mooreana, 803×; sapida, 2950; Van Houttei, 3439×; Wendlandiana, 1624.
Kentucky, 2232; Blue-Grass, 2723×; Coffee Tree, 1420.
Kerguelen's Land Cabbage, 2809.
Kerr, J. W., 1582×.
Keschta, 294×.
Keteleeria Fabri, 3565.
Kew Tree, 1338×.
Khas Khas Grass, 3456.
Khat, 49, 686.
Khus Khus Grass, 3456.
Kickxia, 1305.
Kidjeroekan, 2714.
Kidney Bean, 2576×; Vetch, 303×.
Kigerukkan, 2038×.
Kilmarnock Willow, 3053×.
King-Fern, 2413×; -Nut, 678; Orange, 784; -weed, 271×.
King's Spear, 412.
Kinkan, 1758×.
Kino, 601; Eucalypt, 1156.
Kirtland, Jared P., 1582×.
Kleinia Anteuphorbium, 3150; articulata, 3149×; Grantii, 2291; pendula, 3150; radicans, 3150; spinulosa, 3150; suspensa, 3150.

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Klopstockia cerifera, 726.
Knapweed, 711.
Kneiffia Allenii, 2331×; fruticosa, 2331; glauca, 2331; linearis, 2331×; pratensis, 2331×; pumila, 2331.
Knightia excelsa, 27.
Knot-cone Pine, 2645; -root, 3220×; -weed, 2740.
Koa, 186.
Kodiastigma, 407.
Koellia, 2863.
Kohl, 542.
Kohleria bogotensis, 1706; eriantha, 1706; Warszewiczii, 3115×.
Kola, 824.
Kolpakowskia ixiolirioides, 1710×.
Kordofan Gum, 1417.
Korean Lawn-Grass, 3549.
Korolkowia, 1280.
Korra, 824.
Kowhai, Red, 802×.
Krassang, 1219×.
Kraunhia brachybotrys, 3517; frutescens, 3518; japonica, 3518×; macrostachys, 3518; sinensis, 3517×.
Kraussia coriacea, 3373; floribunda, 3373; lanceolata, 3373.
Krishna Bor, 1231×.
Krynitskia barbigera, 902×; glomerata, 902×.
Kudzu Vine, 2856×.
Kuhnistera, 2561.
Kukui, 245×
Kumara distichа, 260×.
Kumquat, Australian Desert, 1127×; Hongkong Wild, 1270; Marumi, 1270; Meiwa, 1270; Nagami, 1269×; Oval, 1269×; Round, 1270.
Kunzia tridentata, 2862.
Kursk Millet, 3158×.
Kuwini, 1984×.

Labiatæ, 70.
Lablab cultratus, 1065.
Labrador Tea, 1833; Violet, 2632×.
Laburnocytisus Adamii, 1763×.
Laburnum ramantaceum, 2563×; Weldenii, 2563×.
Lacatan, 2079.
Lacebark, 1319×, 1775×; -bark Pine, 2639; Fern, 735, 2135×, 2290×; -leaf, 312.
Laciniaria, 1852×.
Lacquer Tree, 2953×.
Lactarius, 2087×.
Lactuca alpina, 2075×; Bourgæi, 3574; gigantea, 2076; Plumieri, 2076; sativa, 77; virosa, 77.
Lactucarium, 77.
Ladies' Bedstraw, 1311×; Ear-Drops, 1301; Tobacco, 299; Tresses, 3215×.
Ladlewood, 681.
Lady Ardilaun, 287; Finger Banana, 2078×; Slipper, 442×; Washington Geranium, 2532×.
Lady's Mantle, 244×; Seal, 2739×; Slipper, 943×; Thumb, 2741.
Lælia amanda, 1772×; callistoglossa, 1772×; Dominyana, 1772×; Dormaniana, 1773; elegans, 1772×; Schilleriana, 1773.
Lævigatæ (Rosa), 2996×.
Lagenandra toxicaria, 17×.
Lagetta funifera, 59; lintearia, 59.
La-kwa, 2060.
Lama, 1938×.
Lambkill, 1734×.
Lamb's Lettuce, 3427; Quarters, 737.
Laminaria, 5.
Lampasas Mulberry, 2071×.
Lamprococcus, 221×.
Lamp-Wick Plant, 2586.
Landreth, David, 1583.
Langsat, 1818×.
Lansa, 1818×.
Lanseh, 1818×.
Lantern Plant, Chinese, 2608×.
Lanzon, 1818×.
Laportea canadensis, 26×; stimulans, 26×.
Lappa major, 385.
Larch, European, 1822×; Golden, 2845×.
Lardizabala Family, 33.
Lardizabalaceæ, 33.
Large Cane, 446; -leaf Tomato, 1932; -leaved Cucumber Tree, 1966×; -leaved Lime, 3346×; -leaved Maple, 201; Snapdragon, 304×; -toothed Aspen, 2757; White Petunia, 2565.
Larger American Cranberry, 3425×.
Lariciones (Pinus), 2640.
Laricopsis Kaempferi, 2846.
Larix hybrida, 3569; Kaempferi, 2846.
Larkspur, 975; Bee, 977; Musk, 976×.
Lasiagrostis splendens, 3242×.
Lasiandra lepidota, 3344; macrantha, 3344; splendens, 3344.
Lastrea aristata, 1080; membranifolia, 1080; opaca, 1079.
Latania, 2445; borbonica, 1895×.
Late Tulip, 3398×.
Laterifloræ (Scutellaria), 3123.
Lathyrus tuberosa, 41×.
Lattice-leaf, 312.
Laumaile, 1421×.
Lauraceæ, 35.
Laurel, Alexandrian, 961×; American, 1733; California, 3413×; Camphor, 1418; Cherry, 2843×; Chilean, 1827; Chinese, 304; English, 2843×; Family, 35; Great, 2941; -Leaf Willow, 3052; Mountain, 1734; New Zealand, 860×; Oak, 2885; Portugal, 2843×; Sabino, 1967×; Seaside, 2606×; Sheep-1784×; Variegated, 815×.
Laurestinus, 3458×.
Laurocerasus caroliniana, 2844; ilicifolia, 2844; lusitanica, 2843×; Lyonii, 2844; Maackii, 2842×; officinalis, 2843×; sphærocarpa, 2844.
Laurus Camphora, 773; nobilis, 35×; Sassafras, 3082.
Laurustinus, 3458×.
Lavandula angustifolia, 911×, officinalis, 70; Spica, 70, 911×.
Lavanga-lata, 1829×.
Lavauxia brachycarpa, 2332×.
Lavender, 70, 757, 911×; Cotton, 3071; Sea, 3229×.
Lawn-Grass, Korean, 3549.
Lawsonia inermis, 59.
Lawson's Cypress, 730×.
Laymi, 16×.
Lead-Plant, 275×; -wort, 2721×; -wort Family, 65.
Leaf-Beet, 496×; -Cup, Canada, 2744; -Cup, Small-flowered, 2744.
Leafless Rush-Broom, 3470×.
Leather-Jacket, 1155×; -Leaf, 732; -Leaf Grape, 3490; -wood, 944×, 1020.
Lebbeck Tree, 243×.
Leche, 2425×.
Lechenaultia, 1844.
Lechosa, 2460×.
Lechuguilla Fiber, 236×.
Lecythia Family, 59×.
Lecythidaceæ, 59×.
Lecythis spp., 2302×.
Ledenbergia roseo-ænea, 3377.
Ledum buxifolium, 1835×.
Leechee, 1891×.
Leek, Common Wild, 248×.
Legaux, Pierre, 1583×.
Leguminosæ, 41.
Leiantha (Verbascum), 3443×.
Leichtlinia commutata, 1984; protuberans, 1984.
Leighia speciosa, 3352.
Leiorhodium, 2939.
Lembotropis nigricans, 948×.
Lemnaceæ, 18.
Lemon Balm, 442×; Garden, 908; Geranium, 2534; Lily, 1456×; -scented Gum, 1152×; Thyme, 3341×; Verbena, 1707, 1888×; Vine, 2547; Water, 2484.
Lemonia spectabilis, 2915.
Lentibulariaceæ, 73.
Lent Lily, 1868×, 2109×.
Leonia (Salvia), 3065.
Leontodon, 3311.
Leonurus Cardiaca, 70.
Leopard Flower, 485; Lily, 1872; Plant, 1859.
Leopard's Bane, 1066×, 3151.
Leopoldia, 2080×.
Lepargyræa argentea, 3159×; canadensis, 3159×.
Leperisa eucrosioides, 3276.
Lepicystis sepulta, 2745.
Lepidium didymum, 3148×; sativum, 36×.
Lepidobalanus, 2885×.
Lepidorhodium, 2937×.
Lepiota, 2086×.
Lepismium commune, 2929×; myosurus, 2929×.
Leptalix, 1275.
Leptamnium, 1824×.
Leptandra virginica, 3449×.
Leptasea aisoides, 3095; austromontana, 3095; cherleri-oides, 3095; chrysantha, 3094×; flagellaris, 3095×; Hirculus, 3094×.
Leptaxis Mensiesii, 3353.
Leptinella dioica, 868; lanata, 868; plumosa, 868; potentillina, 868; squalida, 868.
Leptodactylon, 1335×.
Leptopteris, 3352×.
Leptosiphon androsaceus, 1337×; aureus, 1337×; carmineus, 1337×; densiflorus, 1337; hybridus, 1337×; roseus, 1337×.
Leptostylæ (Potentilla), 2775×.
Leskea sericea, 7.
Letondal Banana, 2078×.
Letter Plant, 1372.
Lettsomia splendens, 3566.
Lettuce, Lamb's, 3427; Opium, 77; Pastor's, 3189×; Water-, 2650.
Leucadendron argenteum, 27.
Leucanthemum nipponicum, 758; vulgare, 758.
Leucoium vernum, 20×.
Leucorchis, 1005×.
Leucospermum conocarpum, 27.
Leucostegia, 1215.
Leucothoë mariana, 2622×.
Levisticum officinale, 62×, 911×.
Lewelling, Henderson, 1584; Seth, 1584×.
Liatris odoratissima, 3380×.
Liberian Coffee, 823×.
Libertia azurea, 2410×.
Libonia floribunda, 1715; penrhosiensis, 1715.
Lichenes, 6.
Lickorice, 1352×.
Licorice, 176, 1352×.
Licuala, 2445×.
Ligeria, 1350×; speciosa, 3169×.
Lignumvitæ, 44.
Ligularia, 2530; clivorum, 3153×; macrophylla, 3153×; stenocephala, 3153×; Veitchiana, 3153×; Wilsoniana, 3153×.
Ligusticum peloponnesiacum, 2059.
Ligustrina amurensis, 3301×; amurensis var. japonica, 3301×; amurensis var. mandshurica, 3301×; amurensis var. pekinensis; 3301×; pekinensis, 3301×.
Ligustrum amurense, 1440; Ibota, 1440×; japonicum, 1440×; ovalifolium, 1440×.
Lilia regia, 1305.
Liliaceæ, 19.
Liliorhiza, 1280.
Lilium regium, 1305.
Lily, African, 229×; Annunciation, 1868×; Australian Sword, 290; Blood, 1425×; Butterfly, 1441; Candlestick, 1877; Chilian, 267; Chinese Sacred, 2112; Chocolate, 1282; Climbing, 1349×; Coral, 1874×; Cow, 2291×; Cuban, 3117×; Day, 1604; European Turk's-Cap, 1873; Family, 19×; Fern-leaved, 1874×; Florida Swamp, 893×; Giant Prairie, 840×; Ginger, 1441; Golden Spider, 1934; Golden Turk's-Cap, 1873; Ground, 3380×; Japanese Turk's-Cap, 1973; Lemon, 1456×; Lent, 1868×, 2109×; Leopard, 1872; Little Turk's-Cap, 1874; Long-tubed White, 1867×; Madonna, 1868×; Meadow, 1875; Milk-and-Wine, 892×; Nankeen, 1875; -of-the-Nile, 229×, 3536×; -of-the-Palace, 1493; Panther, 1872; Plantain, 1604; Pond-, 2306; Queen, 917; Queensland,- 1067; Ricerroot, 1281×; Rush, 3171; St. John's, 893; Sand, 1848×; Scarborough, 3428; Scarlet Turk's-Cap, 1874; Sego, 635; Showy, 1870×; Solomon's, 402×; Southern Red, 1876; Spear-, 1067; Spider-, 1626; Spotted, 1876; Star, 1877×; Tiny, 1874×; Toad-, 3377×; Tom Thumb, 1874×; Torch-, 1751×; Trumpet, 1867×; Turban, 1873; Water-, 2306; Wheel, 1876; White Mountain, 1848×; White Wood, 3380×; Wild Red, 1876; Wild Yellow, 1875; Wood, 1876; Yellow Day, 1455×; Yellow Pond, 2291×; Yellow Turk's-Cap, 1874.
Lima Bean, 461, 2577.
Limber Pine, 2637×.
Lime, 3345×; -Berry, 3383; Finger-, 2047; Large-leaved, 3346×; Russell River, 2047×; Spanish, 2025×.
Limnanthaceæ, 48.
Limnanthemum indicum, 2316×; lacunosum, 2316×; nymphæoides, 2316×; trachyspermum, 2316×.
Limnanthus Family, 48.
Limnocharis Commersonii, 1624×; Humboldtii, 1624×; nymphoides, 1624×.
Limodorum tuberosum, 636×.
Limonia acidissima, 1219, 1478×; alata, 2714; aurantifolia, 782; bilocularis, 3158×; crenulata, 1478×; Demeusei, 779×; diphylla, 2714; dubia, 2714; gabonensis, 779×; glutinosa, 729; missionis, 2446×; monophylla, 426; pentaphylla, 1352; Preusii, 779×; scandens, 1830; Schweinfurthii, 779×; trichocarpa, 2752; trifolia, 3383; ugandensis, 779; Warneckii, 443×.
Limonium, species of, 3229×.
Linaceæ, 43×.
Linanthus, 1335×; densiflorus, 1842.
Linaria vulgaris, 71.
Linden, 3345×; Common, 3347; Crimean, 3347; Family, 52; Small-leaved, 3347; Weeping White, 3348×; White, 3348.
Lindera Benzoin, 487; hypoglauca, 487.
Lindsæa, 1885.
Ling, 3372.
Linnæa Engleriana, 171×; Perringiana, 171×; Spæthiana, 171×.
Linum catharticum, 43×; trigynum, 2917; usitatissimum, 43×.
Lion's Ear, 1839; Leaf, 1839×; Tail, 1839.
Lippia citriodora, 69×.
Liquidambar orientalis, 40; Styraciflua, 40, 357×.
Liquid Storax, 1889×.
Liquorice, 1352×.
Liriodendron Tulipifera, 34, 357×.

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Liriope graminifolia vars., 3574.
Lissochilus, 2402×.
Listera convallarioides, 2356×; cordata, 2356×; Smallii, 2356×.
Listrostachys, 2402×.
Litchi chinensis, 2303.
Literature, 1509×, 1520×.
Lithocarpus cleistocarpa, 3569×; cornea, 3569×; densiflora, 3569; glabra, 3569×; Henryi, 3569×; thalassica, 3569×; see also 3574.
Lithophragma affinis, 3320; parviflora, 3320×.
Lithospermum graminifolium, 2059; officinale, 69; petræum, 2059.
Lithræa laurina, 2953.
Litobrochia leptophylla, 2853.
Litorella, 1894×.
Littæa, 235×; dealbata, 238×; filamentosa, 238; geminiflora, 238×; glauca, 238×; gracilis, 966; histrix, 238×; Roeslii, 238×.
Littea geminiflora, 238×.
Little Gem, 3536×; Pickles, 2415×; Shellbark-Hickory, 678; Turk's-Cap Lily, 1874.
Littorella, 2656×.
Littæa geminiflora, 238×.
Live-forever, 3131×; Oak, 2889×; Oak, Calif., 2889×.
Liver-Leaf, 1458.
Liverworts, 6.
Living Rock, 391×.
Livistona, 2445×.
Lizard's Tail, 3083×; Family, 23×.
Loasa Family, 57.
Loasaceæ, 57.
Lobelia, 76×; littoralis, 2781.
Loblolly Bay, 1361; Pine, 2643.
Lobster Flower, 1169×.
Loco-weed, 424, 2420×.
Locust, 2955×; Black, 2967; Honey, 1346×; Swamp, 1347; Sweet, 1347; Water, 1347; Yellow, 2967.
Lodeman, E. G., 1584×.
Lodewort, 2909×.
Lodge-Pole Pine, 2644×.
Lodhra cratægoides, 3296.
Lodoicea sechellarum, 16×.
Loduson lahe, 1421×.
Logania Family, 67.
Loganiaceæ, 67.
Logwood, 42, 1427.
Lolium temulentum, 15.
Lomaria Boryana, 514; ciliata, 514; costaricensis, 2655×; nipponica, 514×.
Lombardy Poplar, 2758×.
Lonchocarpus maculatus, 1348×.
London Plane, 2707×; Pride, 3096.
Longan, 2131.
Longifloræ (Salvia), 3063.
Longifoliæ (Pinus), 2639×.
Long-Leaf Pine, 2643; Moss, 3350×; -tubed White Lily, 1867×.
Longworth, Nicholas, 1585.
Lonicera Caprifolium, 75; Xylosteum, 75.
Lonsdale, Edwin, 3554.
Looking-Glass Orchis, 2356; Tree, 1476×.
Loosestrife, 1935×, 3233×; Family, 59; Purple, 1937×; Spiked, 1937×; Swamp, 974; Yellow, 1936×.
Lophospermum erubescens, 2012×; scandens, 2013.
Lophostemon arborescens, 3384.
Lopseed, 2604×; Family, 74.
Loranthaceæ, 27.
Lord Anson's Blue, 1826; White, 1826.
Lord, O. M., 1585.
Lords-and-Ladies, 403.
Lorinseria, 3519×.
Loroma amethystina, 3123×.
Lótos (Nymphæa), 2315.
Lotus, American, 2117; Bark, 66; Blue, 2310×, 2311; corniculatus, 41×; crassifolius, 1604; Douglasii, 1604; East Indian, 2117; Magnolia, 2117×; pinnatus, 1604; siliquosus, 3323×; White, 2315.
Lousewort, 2524; Swamp, 2524×.
Louisiana, 2246.
Lovage, 911×, 1851.
Love-Apple, 1982×, 2474; Entangle, 3127; -Grass, 1126; -in-a-Mist, 2145×; -lies-bleeding, 269×; Plant, 279.
Love's Chain, 304×.
Low Blueberry, 3423×; Hop Clover, 3379.
Lowea berberifolia, 2984×.
Lucerne, 2019×.
Lucuma mammosa, 65×; spinosa, 1362.
Lueddemannia Sanderiana, 1764.
Luetkea cæspitosa, 2563×.
Luhea, 1920×.
Luisia teres, 3077.
Lungwort, 2039, 2857.
Lupine, 1922; Blue, 1923; Tree, 1922×; White, 1923×; Yellow, 1923.
Lupulinaria, 3121×.
Luteæ (Rosa), 2995×.
Luvunga, 1829×.
Lycaste, 2402×; cristata, 2462; jugosa, 824×.
Lychnis Lagascæ, 2563; pyrenaica, 2563; Vaccaria, 3074×.
Lychnitidea (Verbascum), 3443.
Lychnitis (Verbascum), 3442×.
Lycium, 3596.
Lycoperdon, 2088×.
Lycopersicum esculentum, 71.
Lycopodiaceæ, 10×.
Lycopodiales, 1208.
Lycopodium, 10×; cæsium, 3139×; cordifolium, 3140; densum, 3139×.
Lygodium, 1215; palmatum, 9, 1217×.
Lyman, H. M., 1585×.
Lyme-Grass, 1111; Canada, 1111×; Sea, 1111×.
Lyon, T. T., 1585×; Wm. S., 3554.
Lyonia calyculata, 732; lucida, 2622×; mariana, 2622×; nitida, 2622×; racemosa, 1850×.
Lysimachia ciliata, 3234; hybrida, 3234; japonica, 3569×; lanceolata, 3234; longifolia, 3234; quadriflora, 3234.
Lythraceæ, 59.
Lythrum Salicaria, 59.

Macadamia ternifolia, 27, 2303.
Macartney Rose, 2996×.
Macassar oil, 653.
Machærium Tipu, 3351×.
Mackaya bella, 425×.
Maclura aurantiaca, 26×; pomifera, 1440×; tinctoria, 751×; tricuspidata, 911.
Macpalxochiquahuitl, 749×
Macrantha (Acer), 201×.
Macrocarpæ (Pinus), 2645×; (Primula), 2808×.
Macrocarpium, 854.
Macrolobium bifolium, 3493; Vuapa, 3493.
Macropiper excelsum, 2646; methysticum, 2646×.
Macrostigma tupistroides, 3403×.
Macrothyrsus (Æsculus), 228×.
Macrotomia echioides, 395×.
Madagascar Periwinkle, 3471×.
Madder, 74×, 3021; Family, 74×; Wild, 1312.
Madeira Mahogany, 35×.
Madhuca indica, 2300×.
Madia sativa, 77×.
Madonna Lily, 1868×.
Madrona, 383×.
Magnolia acuminata, 357×; compressa, 2046; Family, 34; fuscata, 2046; grandiflora, 357×; Lotus, 2117×; tripetala, 357×; Yulan, 34.
Magnoliaceæ, 33×.
Magothy Bay Bean, 680×.
Maguey, 1306×; Ceniso, 234×; de Cocui, 1306; Manso, 234×; Mapisaga, 234×; Verde, 234×.
Mahaleb Cherry, 2835×.
Mahoe, Mountain, 1487.
Mahogany, 3292; Family, 45×; Gum, White, 1155×; Madeira, 35×; Mountain, 721; Red, 1156; Swamp, 1155.
Mahon Stock, 1972.
Maidenhair Fern, 216×, 218×; Tree, 1338×.
Maiden Pink, 999×.
Maile, 1421×.
Maine, 2152×.
Mairania alpina, 386×.
Maire, 1421×.
Maize, Milo, 1497.
Majorana hortensis, 2406×; Onites, 2406×.
Makimbeira, 2121×.
Malabar Nightshade, 455; Vine, Sweet, 455.
Malachobatus (Rubus), 3025.
Malachodendron ovatum, 3241×.
Malagueta brava, 3526×; hembra, 3526×; macho, 3526.
Malagunto chico, 3526×; grande, 3526.
Malanga, 3523.
Malapoenna, 1894×.
Malayan Jessamine, 3361×.
Maldive-Nut, 1899×.
Male Bamboo, 449; Fern, 1079×.
Malgache Aloe, 1306.
Mallotus philippinensis, 47.
Mallow, Curled, 1974×; False, 1974×; Family, 52; Globe, 3204; Jews', 841×; Marsh, 268; Musk, 1974; Rose-, 1483×; Tree, 1974×.
Malocchia, 653.
Maltese Cross, 1927×.
Malpighia Family, 45×.
Malpighiaceæ, 45×.
Malus acerba, 2870×; angustifolia, 2876; angustifolia var. puberula, 2876; astracanica, 2870×; baccata, 2871×; baccata var. himalaica, 2871×; baccata var. mandshurica, 2871×; baccata var. sibirica, 2871×; bracteata, 2878; communis, 2870; coronaria, 2876, 2877; coronaria var. elongata, 2877; coronaria var. Hoopesii, 2876×; coronaria var. ioensis, 2877×; coronaria var. puberula, 2876; cratægifolia, 2878; Dawsoniana, 2876; florentina, 2878; floribunda, 2875; floribunda var. Arnoldiana, 2875×; fragrans, 2877; fragrans var. elongata, 2877; fusca var. diversifolia, 2876; fusca var. levipes, 2876; glabrata, 2877; glaucescens, 2876×; Halliana, 2872; Hartwigii, 2872; hybrida, 2873; ioensis, 2877×; ioensis var. Bushii, 2877×; ioensis var. creniserrata, 2877×; ioensis var. Palmeri, 2877×; ioensis var. spinosa, 2877×; ioensis var. texana, 2878; kansuensis, 2874; lancifolia, 2876×; Malus, 2870; Matsumuræ, 2873; microcarpa var. baccata, 2871×; microcarpa var. floribunda, 2875; microcarpa var. Kaido, 2873×; microcarpa var. sempervirens, 2876; microcarpa var. Torringo, 2874×; micromalus, 2873×; platycarpa, 2876; platycarpa var. Hoopesii, 2876×; Prattii, 2873; prunifolia, 2873; prunifolia var. Rinki, 2873; pumila, 2870×; pumila var. Rinki, 2873; Ringo, 2873; rivularis, 2875×; rivularis var. diversifolia, 2876; rivularis var. levipes, 2876; Sargentii, 2874×; Scheideckeri, 2875; sempervirens, 2876; Sieboldii, 2874×; Sieboldii var. arborescens, 2874×; Sieboldii var. calocarpa, 2874×; sinensis, 2873×; Soulardii, 2871; spectabilis, 2873×; spectabilis var. Kaido, 2873×; spectabilis var. micromalus, 2873×; sylvestris, 2870×; theifera, 2872×; Toringo, 2874×; transitoria, 2874; Tschonoskii, 2874; yesoensis, 2873; yunnanensis, 2874; Zumi, 2875.
Malva campanulata, capensis, coccinea, lateritia, 1975; miniata, 3204×; purpurata, 1975; rotundifolia, 52×; sylvestris, 52×; umbellata, 3204.
Malvaceæ, 52.
Mamain, 293.
Mamao, 2460×.
Mamey, 1975×; Colorado, 1919; de Santo Domingo, 1975×; Sapote, 1919.
Mamillaria, 1976×.
Mamin, 293.
Mammea americana, 54×.
Mammee-Apple, 1975×.
Mammoth Clover, 3379×.
Mamoeiro, Tree, 2460.
Mamon, 294.
Mamoncillo, 2026.
Manchineel, 1494×.
Mandarin Orange, 784.
Mandera Cucumber, 909.
Mandioca, 1991×.
Mandirola, 2097.
Mandragora, 70×.
Mandrake, 2725×.
Mangifera indica, 48×.
Mango, 1984×; Grape, 3198×; Melon, 908.
Mangrove-Annona, 293; Black, 436; Family, 59×; Honey, 436; White, 436.
Maniguette, 3527×.
Manihot diversifolia, 1720; palmata, 47; utilissima, 47.
Manila Copal, 1417; Hemp, 171, 2078.
Manilla Tamarind, 2652.
Manioc, 1991×.
Manisoba, 1992.
Manisuris, 3020×; granularis, 15.
Manitoba, 569.
Manketti Nuts, 2303.
Manna, 66×; Gum 1156×.
Mannensei, 2974×.
Manning, J. W., 1586×; Robert, 1587.
Mano de Mico, 749×.
Man-of-the-Earth, 1661×; Orchis, 2356.
Manuka, 1843.
Manzanillo, 1494×.
Manzanita, 385.
Maple, 195; Ash-leaved, 204×; Black, 203; Family, 49×; Flowering, 176×; Hornbeam, 201×; Japan, 200; Large-leaved, 201; Mountain, 200×; Norway, 198×; Red, 202×; Rock, 203; Scarlet, 202×; Silver, 202×, 2756; Striped, 202; Sugar, 203; Swamp, 202×; Sycamore, 201; White, 202×.
Mappa Porteana, 1939.
Maracujá melao, 2481×.
Maranta Albertii, 621; albolineata, 621, 623×; arundinacea, 22×; Chantrieri, 623×; conspicua, 622×; discolor, 620; Gouletii, 622; Goveniana, 3596; gracilis, 622×; illustris, 622; imperialis, 623×; leopardina, 623; Louisæ, 622; major, 1688×; Makoyana, 621×; Marcellii, 621; micans, 620; musaica, 624×; Neubertii, 622×; noctiflora, 622×; olivaris, 621×; ornata, 623×; picta, 622×; Porteana, 3277; prasina, 624×; princeps, 623; regalis, 623×; roseo-picta, 620; Sagoreana, 621; Sanderiana, 624; smaragdina, 2063; spectabilis, 3277; tigrina, 624×; Wagneri, 620; Wallisii, 621; Wiotii, 620×; zebrina, 624.

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Marantaceæ, 22×.
Marattia, 1215; Douglasii, 7×; Family, 7×; fraxinea, 7×.
Marattiaceæ, 7×, 1208×.
Marbleberry, 387×.
Marchantiales, 6×.
March Daisy, 486.
Marcgravia dubia, 2064; paradoxa, 2064.
Marguerite, 756; Blue, 1205×; Glaucous, 756; Golden, 299×.
Mariana lactea, 3169.
Marica californica, 3171; striata, 3171.
Marigold, 911×, 3305; African, 3305×; Cape, 1011; Corn, 754×; Fig-, 2040; French, 3305; Marsh, 637×; Pot, 627; Sweet-scented, 3305×.
Marine Ivy, 776.
Mariposa Lily, 631×; Tulip, 633×.
Maritsgula, 664×.
Marjoram, 911×, 2406.
Markery, 737.
Marking-Nut Tree, 3142×.
Marlea begoniifolia, 243; platanifolia, 243.
Marmalade-Box, 1322; Fruit, 1919.
Marmeliera de Campo, 1994.
Maroochie Nut, 1939.
Marram-Grass, 274×.
Marrubium vulgare, 70, 911×.
Marsh Cinquefoil, 835; Elder, 1708; Fern, 1079; Mallow, 268; Marigold, 637×; Pea, 1826; -Pea, Myrtle-leaved, 1826; Pine, 2644×; St. John's Wort, 1632×; Samphire, 3050; Spike-Grass, 1061; Valerian, 3426×.
Marsdenia Condurango, 68; tinctoria, 68.
Marsilea Drummondii, 10; Family, 9×; Nardu, 10.
Marsileaceæ, 9×, 1209.
Martagon, 1871.
Martinezia caryotæfolia, 2445×.
Martynia Craniolaria, 877×; Family, 72×; louisiana, 72×.
Martyniaceæ, 72.
Marumi Kumquat, 1270.
Marvel of Peru, 2056×.
Maryland, 2212×; Dittany, 912×.
Masdevallia, 2402×; Dayanus, 904; fenestrata, 904; gibberosa, 3107; punctata, 3107.
Massachusetts, 2159×.
Massangea, 1419×.
Massowia, 3202.
Masterwort, 424×.
Mastic, 48×, 1417×; Tree, 2650; -Tree, Peruvian, 3109.
Maté, 48×.
Mathiola, 2011×.
Matilija Poppy, 2979.
Matisia cordata, 53.
Mato Colorado, 653×; de la Playa, 653×.
Matricaria Chamomilla, 77.
Matricary, 2010×.
Matrimony-Vine, 1929×.
Maul Oak, 2889×.
Maurandia antirrhiniflora, 305, Lophospermum, 3574.
Mauritia flexuosa, 2303; vinifera, 16×.
Mauritius Hemp, 1306.
Maw Seed, 2455×.
Maxillaria, 2402×; bractescens, 3525; decolor, 3525; densa, 2407×; elongata, 3525×; galeata, 1355; jugosa, 824×; leontoglossa, 3525×; squalens, 3525×.
Maximilianea Gossypium, 56.
Maximowiczia sinensis, 3110×.
May, 886×; -Apple, 208, 2725×; -berry, 3026×; -flower, 1120, 1458; -gowan, 486; Haw, 884×; -pop, 2484×; -weed, 300.
Mayten, 2016×.
Mazzard, 2837×.
McIntosh, John, 1586.
M'Mahon, Bernard, 1586.
Meadia caroliniana, 1063×; Dodecathea, 1063×; Jeffreyi, 1064.
Meadow Beauty, 2928×; Cranesbill, 1331×; Fescue, 1228×; Foam, 1882×; -Grass, 1351×; -Grass, Rough-stalked, 2723×; -Grass, Wood, 1723×; Lily, 1875; Parsnip, 3328; Rue, 3326; Rue, Tall, 3327×; Saffron, 824×; Saxifrage, 3087×, 3157×; -Sweet 1238×, 3214×; Tulip, 633.
Mecca Balsam, 45×.
Medemia, 510.
Medicago lupulina, 41×; sativa, 41×.
Medick, 2019; Black, 2019×; Hop, 2019×.
Mediterranean Hemp, 1306.
Medium grandiflorum, 644.
Medlar, 2043×.
Medusa, Philippine, 191.
Medusa's Head, 1173.
Meehan, Thomas, 1587.
Meelalla, 522.
Megapterium missouriensis, 2331.
Megarrhiza californica, 1096×.
Megasea afghanica, 3086×; ciliata, 3086×; compacta, 3102×; cordifolia, 3086; cordifolia var. alba, 3086; cordifolia var. purpurea, 3086; cordifolia var. rosea, 3086; corrugata, 3102×; crassifolia, 3086; hybrida splendens, 3103; Leichtlinii, 3086×; ligulata, 3086; ligulata var. ciliata, 3086×; orbicularis, 3086; purpurascens, 3086; speciosa, 3086×; splendens 3103; Stracheyi, 3086×; Stracheyi var. Milesii, 3086×.
Meibomia, 991.
Meiracyllium Wettsteinii, 2121×.
Meiwa Kumquat, 1270.
Melaleuca Leucadendron, 60×.
Melandrium, 3163×.
Melanorrhœa usitata, 48×.
Melastoma denticulatum, 2047; Family, 60×.
Melastomaceæ, 60×.
Melegueta, Wild, 3526×.
Melia Azedarach, 45×, 357×.
Meliaceæ, 45×.
Melianthaceæ, 50×.
Melianthus Family, 50×.
Melic Grass, 2025×.
Melissa officinalis, 911.
Melocactus communis, 612.
Melon Apple, 908; Chinese Preserving, 486×; Cucumber, 908; Dudaim, 908; Mango, 908; Netted, 908×; Nutmeg, 908×; Orange, 908; Pear, 3182×; Pineapple, 908×; Pomegranate, 908; Queen Anne's Pocket, 908; Rock, 908×; Shrub, 3182×; Snake, 908; Spurge, 1172×; Tree, 2460×; Winter, 908; Zapote, 2460×.
Memorial Rose, 2986×.
Meniscium, 1215.
Menispermaceæ, 33.
Menispermum acutum, 3170; Columba, 1719×; palmatum, 1719×.
Mentha perilloides, 2553; piperita, 911×; Pulegium, 70, 911×; spicata, 70, 911×.
Menthol, 1418.
Mentzelia aurea, 3582, 3597; bartonioides, 1161×; hispida, 57×.
Menudito, 1994.
Menyanthes exaltata, 3470×; indica, 2316×; nymphæoides, 2316×; sarmentosa, 3470×.
Menziesia cærulea, 2607×; empetriformis, 2607×; polifolia, 950; polifolia nana, 950; polifolia pygmæa, 950.
Mercury, 737, 2038; Three-seeded, 190×.
Meriolix serrulata, 2329×.
Mertensia, 1348.
Mescal, 20×, 231; Button, 1915; Tequila, 232×.
Mesembryanthemum, 2921; crystallinum, 30×; edule, 30×.
Mesocarpæ (Pachira), 2423×.
Mespilus arbutifolia var. erythrocarpa, 396×; Pyracantha, 2863×.
Mesquit, 2811.
Mesquite, 2811.
Metcalf Bean, 2574.
Methonica grandiflora, 1349×.
Metrosideros floribunda, 3565×; semperflorens, 630.
Metroxylon elatum, 1481, 2623; Rumphii, 16×.
Mexicanæ (Cratægus), 884×.
Mexican Buckeye, 3414; Butterwort, 2631×; Coral Drops, 496; Earflower, 938; Fire Plant, 1170; Flame-Leaf, 1169×; Foxglove, 3323×; Jumping Bean, 3124; Orange, 751×; Red Salvia, 3063×; Star, 2051; Star of Bethlehem, 2051; Tea, 737; Tulip Poppy, 1614×; Twin-Flower, 545; White Oak, 2890×.
Meyenia erecta, 3339; Vogeliana, 3339×.
Mezcal-button, 1915.
Mezereum, 963; Family, 58×.
Michælmas Daisy, 416.
Michelia Champaca, 34.
Michigan, 2184×.
Micrampelis, 1096.
Micranthes æstivalis, 3093; arguta, 3093; californica, 3098; davurica, 3092×; Geum, 3096; integrifolia, 3093; Lyallii, 3092×; micranthidifolia, 3092×; pennsylvanica, 3092×; virginiensis, 3093.
Micranthus, 2577.
Microcerasus, 2833×.
Microgenetes, 2566.
Microlepia, 1215.
Micromeles alnifolia, 3197×; caloneura, 3197×; Decaisneana, 3198; Folgneri, 3197×; japonica, 3198.
Micromeria varia, 3082×.
Microphyllæ (Rosa), 2997.
Micropteryx Poeppigiana, 1142.
Microrhamnus franguloides, 2923.
Microstephium niveum, 904×.
Mida acuminata, 2302.
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Oxalis, Blue, 2475×; Family, 43.
Ox-eye Daisy, 758; -lip, 2798.
Oxyacanthæ (Crataegus), 886×.
Oxycedrus, 1727.
Oxycoccus erythrocarpus, 3425×; macrocarpus, 3425×; Oxycoccus, 3425×.
Oxystelma esculentum, 68.
Oxytenanthera, 449×.
Oxyura chrysanthemoides, 1832×.
Oyster Plant, 3365; Plant, Spanish, 3120×; Vegetable, 3365.
Ozomelis trifida, 2058.
Ozothamnus rosmarinifolius, 1450×.

Pachydendron africanum, 260; angustifolium, 260; ferox, 260×; principis, 260; pseudoferox, 260×; supralæve, 260×.
Pachylophus cæspitosus, 2332×.
Pachyphytum bracteosum, 870.
Pachyrhizus Thunbergianus, 2856×.
Pachysandra coriacea, 3077×.
Pachystachys, 1714.
Pachystoma speciosum, 1662.
Pacific Plum, 2827.
Pacourina edulis, 77×.
Padus alabamensis, 2842×; australis, 2842×; caroliniana, 2844; Cuthbertii, 2842×; eximia, 2842×; Laurocerasus, 2843×; lusitanica, 2843×; Mahaleb, 2835×; nana, 2843; racemosa, 2843; serotina, 2842×; serotina var. neomontana, 2842×; Saiori, 2843×; vulgaris, 2843; Wilsonii, 2845.
Pædcrota Bonarota, 3449×; chamædryfolia, 3449×.
Pædcrotæ (Veronica), 3449.
Pæonia, various names, 3598.
Pæony, 2431.
Pagoda Tree, Japan, 3191×.
Painted-Cup, 683; Leaf, 1170.
Pak-choi Cabbage, 543.
Palafoxia Hookeriana, 2574×.
Palaquium Gutta, 1706×.
Palas Kino, 601.
Palay, 904×.
Pale Touch-me-not, 1642×.
Palicourea, 2949×.
Pali-mara, 266×.
Paliurus Spina-Christi, 51.
Pallasia, 635×.
Palm, Bamboo, 2910×; Barrel, 2810; Beach, 441; Blue, 1140×, 3045; Bottle, 2810; Cabbage, 2405; Carnauba, 840×; Cohune, 428×; Dracena, 842; Family, 16; Fortune's, 3362; -Grass, 2453; Honey, 1721; Ita, 2013; Moriche, 2013; Nut, 932; Palmyra, 522; Pindo, 815; Pissaba, 428×; Porto Rico Hat-, 3044×; Roffia, 2910×; Sago, 932×, 2045; Silver-, 808; Snake, 276×; Thatch, 3333; Thatch-leaf, 1612×; Thief-, 3240×; Umbrella, 941, 1442; Wax-, 1019×; Wine, 16×, 2910×; Yucca, 3530.
Palma Barrigona, 2810; Christi, 2965×; Dulce, 539×.
Palmaceæ, 16.
Palmata (Acer), 199×.
Palmetto, Blue, 2926; Cabbage, 3044×; Dwarf, 3045; Saw, 3156×; Scrub, 3045.
Palmyra Palm, 522.
Palo Amarillo, 1173×; Bobo, 293; de Campeche, 1427×; de Leche, 3072×; de Sal, 436; de Vela, 2475; Estaca, 613; Fierro, 1935; Muerto, 229; Verde, 2474×.
Palumbium, 2403.
Pampas-Grass, Hardy, 1129.
Panax Balfourii, 2748; cochleatum, 2748×; crispatum, 2748×; Deleauanum, 2748×; diffusum, 2748×; dissectum, 2748×; dumosum, 2747×; excelsum, 2747×; filicifolium, 2748; fissum, 2748×; fruticosum, 2747×; Ginseng, 62×; horridum, 1096×; laciniatum, 2748; lepidum, 2748×; Mastersianum, 2748×; monstrosum, 2748; monstrosum aureum, 2748; multifidum, 2748×; Murrayi, 2748×; nitidum, 2748×; ornatum, 2748×; plumatum, 2747×; quinquefolium, 62×; sessiliflorum, 192×; trifolium, 2303; Victoriæ, 2748.
Pancratium calsthinum, 1627×; caribæum, 1627; declinatum, 1627; rotatum, 1627.
Pandanaceæ, 13.
Pandanophyllum hypolytroides, 1994.
Pandanus utilis, 13.
Pangium edule, 56×.
Panicularia americana, 1351×; nervata, 1352.
Panicum frumentaceum, 1096; Melinis, 2026; tonsum, 3374×; variegatum, 2356×.
Pansy, Bedding, 3473.
Panther Lily, 1872.
Pao d' Embira, 3526×.
Papachi, 2904×.
Papaveraceæ, 35×.
Papaver cambricum, 2017×; heterophyllum, 2017×; somniferum, 35×; Stylophorum, 3279.
Papaw, 405.
Papaya gracilis, 664.
Paper Birch, 499; Plant, Egyptian, 941; -Reed, 2472×.
Papulosa, 2042×.
Papyrus, 941; Antiquorum, 941.
Paracembra (Pinus), 2638×.
Para Cress, 3205×; -Grass, 2453; -Nut, 494; Palm, 1176×; Rubber Tree, 1482×.
Paradise Apple, 2870×; Flower, 189.
Paraguay Tea, 1637×.
Paramignya angulata, 2038×; Blumei, 2714.
Parapinaster (Pinus), 2639×.
Parasol Tree, Chinese, 3239.
Paratropia polybotrya, 3108×; venulosa, 3108×.
Pardanthopsis (Iris), 1675.
Pardanthus chinensis, 485; sinensis, 485.
Pareira brava, 775; False, 775.
Parietaria diffusa, 26×; erecta, 26×.
Paris Daisy, 756.
Paritium tiliaceum, 1487.
Parkia africana, 2303.
Parmena spectabilis, 3026×.
Parnassus, Grass of, 2475.
Parosela, 960×.
Parrotiopsis involucrata, 2476×.
Parrot's Bill, 802×.
Parrot Tulip, 3399.
Parsley, 911×; Family, 62×; Vine, 3485.
Parsnip, Cow-, 1458×; Meadow, 3328; Water, 3171×.
Parsons, S. B., 1590.
Parthenium Matricaria, 756.
Parthenocissus himalayana var. semicordata, 3491×; semicordata, 3491×.
Partridge Berry, 1319, 2057×, 3425; Pea, 680.
Pasania, cornea, 2303, 3569×; cuspidata, 2303, 2891; densiflora, 3569; glabra, 3569×; thalassica, 3569×; see also 3570.

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Pascalia glauca, 3510×.
Pasionaria, 2481×.
Pasque Flower, American, 284×; of Europe, 285.
Passerina hirsuta, 3340×; Tartonraira, 3340×.
Passifloraceæ, 56×.
Passiflora quadrangularis, 56×; rubra, 56×.
Passion-Flower, 2480; -Flower Family, 56×; -Flower, Wild, 2484×; -Flower, Wild Yellow, 2483; -Vine, Red, 2486.
Pastor's Lettuce, 3189×.
Pasture Thistle, 774×.
Patchouli Plant, 2727.
Patens, Wild, 284×.
Paths, 3496×.
Patonia parvifolia, 3527×.
Paullinia pinnata, 50×.
Pavia alba, 228×; atropurpurea, 228; glabra, 227×; hybrida, 228; lutea, 227×; Lyonii, 228; Michauxii, 228; pallida, 227×; rubra, 228.
Pavonia hastata, 3570×.
Pawpaw, 664; Family, 57.
Pea, Australian, 1065; Beach, 1826; Black, 1826×; Black-eyed, 3469×; Butterfly-, 714, 803×; Chick-, 769; Congo, 613×; Corn-field, 3469×; Dwarf Golden Yellow-flowering, 901×; Everlasting, 1825×; Family, 41; Field, 2650×; Flat, 1825×; Garden, 2650×; Glory, 802×; Hoary, 3321×; Lord Anson's Blue, 1826; Marsh, 1826; Partridge, 680; Perennial, 1825×; Persian Everlasting, 1825×; Pigeon, 613×; Scurfy, 2849; Sea, 1826; Seaside, 1826; Sensitive, 680×; Shamrock-2475×; Showy Wild, 1826; Sugar, 2650×; Tangier Scarlet, 1825×; Tree, 659×; Two-flowered, 1825×; -Vine Clover, 3379×; Wild, 1826; Winged, 1917×; Wing-stemmed Wild, 1826.
Peach, 3077; Flat, 2833; history, 1514×; -Leaf Willow, 3052; Vine, 908; Wild, 2834×.
Peacock Flower, 2727; Flower Fence, 215; Gazania, 1321; Poppy, 2458.
Peanut, 343×; Hog, 278×.
Pear, Anchovy, 1413×; Balsam, 2060; Chinese, 2869; Garlic, 889; history, 1514; Japanese, 2869; Melon, 3182×; Sage-leaved, 2868; Sand, 2869; Snow, 2868; Tomato, 1931×.
Pearl-Bush, 1194; Fruit, 1996×; Millet, 2537; -wort, 3048.
Pecan, 2297×; Bitter, 676×.
Pedaliaceæ, 72.
Pedalium Family, 72; Murex, 72.
Pedicellaria, 1421.
Peepul Tree, 1232×.
Peiresia, 2547.
Peireskia, 2547.
Pelargium, 2532.
Pelargonium acerifolium, 3570×.
Pelican-Flower, 393×.
Pellæa, 1215×; atropurpurea, 1217×; gracilis, 903×; Stelleri, 903×; tenera, 2290×.
Pellote, 1915.
Peltandra virginica, 17×.
Peltiphyllum peltatum, 3102×.
Pemphis acidula, 59.
Penicillaria spicata, 2537.
Pennisetum americanum, 15.
Pennsylvania, 2173×.
Penny Cress, 3333.
Pennyroyal, 911×, 2035×; American, 1437; Bastard, 3377.
Pennywort, 869×; Water, 1624×.
Pentagynæ (Crataegus), 886×.
Pentanthera, 2941×.
Pentapyxis, 1852.
Pentarhaphia craniolaria, 1334; libanensis, 1333×; longiflora, 1333×.
Pentasepalæ (Veronica), 3452.
Pentlandia miniata, 3416.
Pentstemon mexicanus, 3323×; nemorosus, 736×.
Peony, 2431; Tree, 2434.
Pepino, 3182×; Angolo, 3161.
Pepper, Black, 2646×; -bush Family, 63; -bush, Sweet, 802; Cayenne, 658×; Family, 23×; -Grass, 1841; Guinea, 3528; Japanese, 2646×; Negro, 3528; Red, 658×; Red Cluster, 659; -Root, 988; -Tree, Californian, 3109; -Tree, Monk's, 3481; Vine, 278; Wall, 3127; -wood, 3538.
Pepperidge, 2316×.
Peppermint, 911×, 2035; Camphor, 1418; Gum, 1157; Stringybark, 1156.
Peramium, 1357×.
Perclymenum, 1911.
Perennial Pea, 1825×; Rye-Grass, 1902×.
Perescia, 2547.
Pericallis cruenta, 771.
Periclymenum americanum, 1912×.
Peridineæ, 4×.
Perilla vars., 3574.
Periodicals, 1559.
Peristeria, 2403; Barkeri, 208×; Humboldtii, 208×.
Periwinkle, Cape, 3471×; Common, 3471; Madagascar, 3471×.
Perotis latifolia, 15.
Perowskia, 2555×.
Perpetual Strawberry, 1272×.
Persea americana (gratissima), 3599; gratissima, 35×; indica, 35×.
Persian Everlasting Pea, 1825×; Walnut, 1722; Yellow Rose, 2995×.
Persica Davidiana, 2833; Davidiana var. alba, 2833; domestica, 2832×; lævis, 2833; nucipersica, 2833; platycarpa, 2833; Simonii, 2827; vulgaris, 2832×.
Persicaria amphibia, 2741×; orientalis, 2741.
Persoonia saccata, 27.
Peru-Balsam Tree, 2095×.
Peruvian Bark, 770; Jacinth, 3117×; Mastic-Tree, 3109.
Petilium, 1280.
Petiolares (Primula), 2805.
Petræae (Veronica), 3452×.
Petroselinum hortense, 911×; sativum, 62×.
Pe-tsai Cabbage, 543×, 3582.
Pettit, Murray, 1590.
Petunia acuminata, 2142; Violet-flowered, 2565; viscosa, 2142.
Petunioides, 2141.
Peucedanum dasycarpum, 1903; Hallii, 1903; leiocarpum, 1903×; simplex, 1903; triternatum, 1903×; verticillare, 3359.
Peyote, 1915.
Peyotl, 1915.
Peyricoboom, 3527.
Phædranassa eucrosioides, 3276.
Phæophyceæ, 5.
Phæthusa occidentalis, 3447; virginica, 3447.
Phaius, 2403; albus, 3340; Bensoniæ, 3340; Marshalliæ, 3340×.
Phalænopsis, 2043.
Phalangium, 300.
Pharaoh's Fig, 1234.
Pharbitis diversifolia, 1659×; hispida var. Dickensonii, 1659×.
Phascales, 7.
Phaseolodes japonicum, 3518×.
Phaseolus coccineus (multiflorus), 3599; max, 1352; vexillatus, 3469×; vulgaris, 41×.
Phaulopsis, 2577.
Pheasant's Eye, 221, 2112×; Eye Pink, 998×.
Phegopteris, 1217×.
Phelipæa, 2578×.
Philadelphus gloriosus, 3571.
Philibertella clausa, 2583.
Philippine Islands, 1702; Medusa, 191.
Philodendron pertusum, 2064.
Philogyne heminalis, 2111; minor, 2111; odora, 2111; rugulosa, 2111.
Philotria canadensis, 1110×.
Phlebodium, 1215×; Mayii, 2608.
Phleum pratense, 15.
Phlox, California, 1883.
Phœniciophorium sechellarum, 3240×.
Phœnix, 2445×; dactylifera, 16×.
Phormium tenax, 20.
Photinia japonica, 1134×.
Photonastie, 1857.
Phototaxis, 1857.
Phototropism, 1856×.
Phragmites communis, 15.
Phrymaceæ, 74.
Phrynium eximium, 622×; propinquum, 620×; pumilum, 620.
Phycomycetes, 5×.
Phyla nodiflora, 1889.
Phyllamphora mirabilis, 2128×.
Phyllanthus turbinatus, 559.
Phyllaurea Codiæum, 816×.
Phyllitis, 1215×.
Phyllocactus Ackermannii, 1123×; anguliger, 1123×; biformis, 1060×; crenatus, 1123; grandis, 1123; Hookeri, 1123×; latifrons, 1123×; phyllanthoides, 1124; stenopetalus, 1123×; strictus, 1123×.
Phyllocytisus, 948×.
Phyllotænium Lindenii, 3523.
Phyllothamnus erectus, 2607×.
Phymatodes, 1215×.
Physalis Alkekengii, 71.
Physalodes peruvianum, 2140.
Physic-Nut, 902, 1720; French, 1720.
Physocarpus, name of, 3600.
Physocaulis, 2077.
Physostigma venosum, 42.
Physurus, 2403.
Phytarrhiza Lindenii, 3350×.
Phytelephas macrocarpa, 17, 2445×; Seemannii, 2303.
Phytolaccaceæ, 30.
Phytolacca decandra, 30; volubilis, 1127.
Phytophthora infestans, 5×.
Picea alba, 1440×; excelsa, 1440×; grandis, 174; nobilis, 174×.
Pichi, 70×.
Pickerel-Weed, 2753; Family, 18×.
Pico de Gallo, 3527×.
Picotee, 999×.
Picræna, 2621×.
Picrasma excelsa, 45.
Picrotoxine, 33×.
Pie Cherry, 2836×; -Plant, 2927×.
Pierardia dulcis, 440×.
Pigeon Grape, 3489×; Pea, 613×; Plum, 808.
Pignut, 676×, 677, 2340, 3169×; -nut, Small, 677; -weed, 737.
Pilocarpine, 2623×.
Pilocereus Bruennowii, 2404; Celsianus, 2404; Celsianus Bruennowii, 2404; chrysomallus, 2424×; Columna-Trajani, 2425; Dautwitzii, 2404; exerens, 715×; floccosus, 715; fossulatus, 2404; Haagei, 2404; Hoppenstedtii, 715; Houlletii, 715; polylophus, 715; Royenii, 715; Schottii, 1915; scoparius, 715×; senilis, 715; virens, 715×.
Pilogyne suavis, 2033×.
Pilumna fragrans, 3375; nobilis, 3375.
Pimenta acris, 60×; de Macaco, 3526×; officinalis, 60×.
Pimento, 249×.
Pimpernel, 279×.
Pimpinella Anisum, 62×, 911; integerrima, 3304×.
Pimpinellifoliæ (Rosa), 2995.
Pinaceæ, 12.
Pinacoua, 1306×.
Pinanga decora, 3571; patula, 3571.
Pinaster (Pinus), 2640.
Pincnectitia glauca, 2147×; tuberculata, 2147×.
Pin Cherry, 2836; -Clover, 1136×; Oak, 2883×.
Pindaiba, 3526×.
Pindo Palm, 815.
Pine, Aleppo, 2643; Austrian, 2641; -Barren Beauty, 2878×; Bull, 2642×, 2645×; Calabrian, 2641×; Cedar, 2645×; Cluster, 2643×; Colonial, 346; Coriscan, 2641×; Crimean, 2641×; Cypress, 631; Digger, 2645×; Family, 12; Foxtail, 2639×; Frankincense, 2643; Ground-, 1932; Hickory, 2639×; Hoop, 346; Jack, 2644; Japanese Black, 2642; Japanese Red, 2640; Jeffrey's, 2642×; Jersey, 2644; Kawri, 230×; Knotcone, 2645; Lace-Bark, 2639; Limber, 2637×; Loblolly, 2643; Lodge-Pole, 2644×; Long-Leaf, 2643; Marsh, 2644×; Monterey, 2645; Moreton Bay, 346; Mountain White, 2638×; Norfolk Island, 345×; Norway, 2640; Nut, 2638×, 2639; Old Field, 2643; Pitch, 2644×, 2645×; Pond, 2644×; Poverty, 2643×; Prickle-cone, 2644×; Red, 2640; Running-, 1932; Sand, 2644; Scotch, 2640×; Screw-, 2449; Scrub, 2644; Slash, 2643; Soledad, 2645×; Southern, 2643; Spruce, 2642×, 2644, 2645×; Stone, 2639×; Strawberry, 1272; Sugar, 2638×; Swamp, 2643; Swiss Mountain, 2641; Swiss Stone, 2637; Table Mountain, 2643×; Umbrella, 3115×; White, 2638; White-Bark, 2639; Wild, 578×; -Wood Grape, 3490; Yellow, 2642×.
Pineæ (Pinus), 2639×.
Pineapple Family, 18; Flower, 1102; Guava, 1204×; Melon, 908×.
Piney, 2431.
Pinguin, 578×.
Pinha, 294×.
Pink, 997×; Broom, 2291; Calla, 3536; Cheddar, 999; Clove, 999×; Cushion, 3167×; Family, 31; Fife, 3167; French, 711×; Fritillary, 1281×; Grass, 998×; Ground, 2589×; Indian, 1898×, 2879; Maiden, 999×; Moss, 2589×; Mullein, 1927×; Pheasant's Eye, 998×; -Root, 3205×; Scotch, 998×; Sea, 395, 3228; Shower, 680×; Stud-, 1455; Swamp-, 1455; Wild, 3168×.
Pinnatifidæ (Crataegus), 887×.
Pinnon, 2638×.
Pinus Abies, 2618; Fortunei, 1737×; Omorika, 2621; Picea, 2618; spp., 2303×; sylvestris var. Watereri, 3571; various varieties (n. combs.), 3574; Wateriana, 3571.
Pinxter Flower, 2942.
Piper, 24; excelsum, 1962; umbellatum, 1437.
Piperaceæ, 23×.
Pipe Vine, 393.
Pipinella, 3124×.
Pipsissewa, 747×.
Piptatherum Thomasii, 2411×

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Piptomeris, 1713×.
Pircunia dioica, 2614×; esculenta, 2614×.
Pironneava, 221×.
Pirus, 2865.
Pissaba Palm, 428×.
Pistache, 2648×.
Pistachio, 2648×; Chinese, 2649×; Nut, 48.
Pistacia lentiscus, 48×; Terebinthus, 48; vera, 48, 2303×.
Pistorinia hispanica, 869×.
Pisum sativum, 41×.
Pita, 1306.
Pitanga, 1162×.
Pitcairnia alpestris, 2863; cærulea, 2862×, 2863; chilensis, 2862×; coarctata, 2862×; spathacea, 2863.
Pitcher-Plant Family, 37×; Indian, 3078×.
Pitch Pine, 2644×, 2645×.
Pithecoctenium cinereum, 1061×.
Pithecolobium arboreum, 3066×; filicifolium, 3066×; Saman, 3066×.
Pith-Tree, 1477.
Pits, 2686.
Pittosporaceæ, 39.
Pittosporum Family, 39; flavum, 1628×; Tobira, 1440×.
Plagianthus Lyallii, 1319×.
Plagiospermum sinense, 2809.
Plagius grandiflorus, 758×.
Plane, London, 2707×; Oriental, 2707×; -Tree, 2706×; -Tree, American, 2708; -Tree Family, 40.
Planera Abelicea, 26; acuminata, 3540×; carpinifolia, 3540×; crenata, 3540×; japonica, 3540×; Keakii, 3540×; repens, 3413; Richardii, 3540×.
Plantaginaceæ, 74.
Plantago, 74×; uniflora, 1894×.
Plantain, 2078×; Buck's-horn, 2056×; Family, 74; Poor Robin's, 1133×; Rattlesnake, 1357; Water-, 246×; Wild, 1451.
Plant-cellars, 2686; Quarantine, 1647×.
Plasmopara viticola, 5×.
Platanaceæ, 40.
Platanoidea (Acer), 198×.
Platanthera iantha, 1425.
Platanus occidentalis, 357×; orientalis, 357×.
Plathymenium (Limonium), 3231×.
Platyaster, 893×.
Platycerium, 1215×.
Platyclinis, 2403.
Platyloma Bridgesii, 2534×; falcatum, 2534×.
Plectocephalus americanus, 712×.
Plectopoma, 1350×.
Pleione, 2403.
Pleroma candidum, 3344; elegans, 3344; macranthum, 3344; sarmentosum, 3344; splendens, 3344.
Plethiosphace (Salvia), 3060×.
Pleurisy Root, 404×.
Pleurothallis, 2403; fenestrata, 904; maculata, 904; sagittifera, 2291×.
Pleurotus, 2087×.
Plum, Alleghany, 2830; Alpine, 2824×; Apricot, 2827; Batoko, 1241; Beach, 2831; Big-Tree, 2828; Canada, 2828; Cherry, 2825; Chikasaw, 2829×; Cocoa-, 766×; Common Garden, 2826; Common Wild, 2827×; Creek, 2829, Darling, 2922×; Governor, 1241; Guiana, 1080; history, 1514×; Hog, 2829, 3217, 3525; Hortulana, 2828×; Italian, 2825×; Japanese, 2826×; Kafir, 1432; Mountain, 3525; Myrobalan, 2825; Natal, 664×; Oklahoma, 2831; Oregon, 2827×; Pacific, 2827; Pigeon, 808; Sand, 2829×; Seaside, 3525; Shore, 2831; Simon, 2827; Sisson, 2827; Spanish, 3217; Tomato, 1931×; Wild Goose, 2829×.
Plumbaginaceæ, 65.
Plumbago Larpentæ, 719.
Plume-Grass, 1129; Poppy, 518.
Pneumaria maritima, 2039.
Poa abessyinica, 15, 1126; amabilis, 1126×; pratensis, 15.
Pochote, 700.
Podalyria capensis, 3480×; lupinoides, 3332.
Podocarpus koraiana, 716.
Podocytisus caramanicus, 1763×.
Podophyllum diphyllum, 1720×.
Poet's Narcissus, 2112×.
Pogonia, 2403; pendula, 3383; verticillata, 1707×.
Pogoniris, 1669×.
Pogostemon Patchouli, 70.
Poinciana, 612.
Poinsettia pulcherrima, 1169×.
Poire a poudre, 444.
Poiree, 496×.
Poiretia, 1611.
Poison Elder, 2953×; Ivy, 2953×; Oak, 2953; Sumac, 2953×; Tree, 3073.
Poivrea coccinea, 835.
Poivre des Negres, 3527×.
Poke, 2614; Indian, 3440×.
Poker-Plant, 1752×.
Pokeweed, 2614; Family, 30.
Polemoniaceæ, 68×.
Polemonium cæruleum, 68×; Family, 68×.
Polianthes maculata, 1983×.
Polium (Teucrium), 3325.
Polyactium, 2529×.
Polyanthus Narcissus, 2111×.
Polycalymma Stuartii, 2093×.
Polycarpa Maximowczii, 1637.
Polygalaceæ, 46.
Polygala Senega, 46×.
Polygonaceæ, 28×.
Polygonum, 28×; crispulum, 427×; Fagopyrum, 1201×; tataricum, 1201×.
Polymnia grandis, 2064×.
Polypodiaceæ, 8×, 1209.
Polypodium, 1215×, 1217×; aureum, 2585; Feei, 3142×; glaucum, 2608; hexagonopterum, 2577×; Mandaianum, 2585; musæfolium, 2607×; nigrescens, 2607×; Schneideri, 2585; Swartzii 2607×.
Polypody, 2744×; Family, 8×.
Polyporus, 2087×.
Polyscias odorata, 3108.
Polystachya, 2403.
Polystichum, 1215×, 1217×.
Pome-Fruits, 2865.
Pomegranate, Dwarf, 2862; Family, 59×; Melon, 908.
Pomme Blanche, 2849×; -Cannelle, 294×; Cythere, 3216×; -Liane, 2481×.
Pompon Rose, 2989×.
Poncirus trifoliata, 1440×.
Pond-Apple, 293; -Lily, 2306; -Lily, Yellow, 2291×; Pine, 2644×; -weed, 2767; -weed, Cape, 311×; -weed Family, 13×; -weed, Horned, 3534.
Pongam pinnata, 2753.
Pongelion excelsum, 242; Vilmorinianum, 241×.
Pontederiaceæ, 18×.
Pontederia crassipes, 1105.
Poor Man's Weatherglass, 279×; Robin's Plantain, 1133×.
Popinac, 188×; White, 1848.
Poplar, Athenian, 2757×; Balsam, 2762×; Birch-leaved, 2758; Black, 2757×; Black Italian, 2761×; Bolle's, 2756; Box, 1152×; Carolina, 2759; Downy, 2762; Eugene, 2760; Gray, 2756; Hybrid Carolina, 2760; Italian, 2758×; Japan, 2763×; Lombardy, 2758×; Ontario, 2763; Queensland, 1499; Swiss, 2761×; White, 2755×, 2756×; Yellow, 34, 1890.
Pop-Nut, 2340.
Poppy, 2455×; Alpine, 2459×; California, 1145×, 2712; Celandine, 736, 3279; Corn, 2457; Family, 35×; Flaming, 2017×; -flowered Anemone, 285; Horned, 1346; Iceland, 2459×; Matilija, 2979; Mexican Tulip, 1614×; Oil, 35×; Opium, 2458; Oriental, 2459; Peacock, 2458; Plume, 518; Prickly, 390×; Satin, 2017×; Sea, 1346×; Shirley, 2457×; Tulip, 2458×; Water,- 1624×; Welsh, 2017×; Wind, 2017×; Yellow Chinese, 2018×.
Populus, 24; deltoides var. carolíniana, 357×; carolinensis, 3601; nigra var. fastigiata, 1440×; nigra var. italica, 357×.
Porcupine-Grass, 3242×.
Porophyllum 1751×.
Porphyrion (Saxifraga), 3102.
Porteranthus, 1337×.
Portland Arrow-root, 18.
Porto Rico, 1689; Hat-Palm, 3044×.
Portugal Laurel, 2843×.
Portulaca oleracea, 30×.
Portulaceæ, 30×.
Portuna floribunda, 2622.
Posidonia, 13×.
'Possum Grape, 3487.
Post Oak, 2887, 3490; Swamp, 2887.
Potato, Air, 1013×; Chinese, 1013; Darwin, 3181; Indian, 1448×; Vine, 3185×; -Vine, Wild, 1661×.
Potentilla Friedrichsenii, 3571; fruticosa var. Friedrichsenii, 3571, 3574; fruticosa var parvifolia, 3571; fruticosa var. Veitchii, 3571; palustris, 835; parvifolia, 3571; Salesoviana, 835.
Poterium Sanguisorba, 600×, 3070.
Pot-herb Mustard, 544.
Pothomorphe umbellata, 1437.
Pothos argyræus, 3119; cannæfolia, 3202; celatocaulis, 2064×; pertusus, 2925×; spinosus, 1823×.
Pothuava, 221×.
Pot Marigold, 627.
Potosina, 232×.
Potting soils, 3178×.
Pourthiæa arguta, 2596; villosa, 2596.
Pouteria Caimito, 1919.
Pouzolzia tuberosa, 26×.
Poverty Pine, 2643×.
Powder-flask, 444.
Prairie Apple, 2849×; Clover, Silky, 2561×; Clover, Violet, 2561×; Clover, White, 2561; Crab-Apple, 2877×; Dock, 2477×, 3169; Flax, 1887×; Rose, 2985×; Turnip, 2849×; Vetchling, 1826×; Willow, 3054.
Precooling, 3369×.
Prescott, C. R., 1590×.
Prickle-cone Pine, 2644×.
Prickly Ash, 3537×; Comfrey, 3294×; Lettuce, 1766×; Poppy, 390×; Thrift, 191×.
Pride of California, 1826×; of India, 1756×, 2024×; of the Congo, 3536×.
Prim, 1859.
Primavera, 3303×.
Primrose, Arabian, 395×; Baby, 2796; Bear's-ear, 2794; Buttercup, 2791; Cape, 3272×; Chinese, 2791×; Evening, 2328×; Fairy, 2795×; Family, 64×; Peerless, 2112×; Willow, 1730.
Primulaceæ, 64×.
Primula officinalis, 65; Vitaliana, 1067×; vulgaris, 65.
Prince Edward Island, 563×.
Prince, Wm., 1590×; Wm. Robert, 1591.
Prince's Feather, 270, 2741.
Pringle, C. G., 1591×.
Prinos deciduus, 1640×; lævigatus, 1640×; verticillatus, 1640×.
Pritchardia, 2445×; filamentosa, 3507; filifera, 3507; grandis, 1855; pacifica, 3279.
Privet, 1859; Egyptian, 1831.
Proboscidea Jussieui, 2005.
Proboscis Flower, 2005.
Prophet-Flower, 395×.
Prosartes lanuginosa var. Hookeri, 1061; Menziesii, 1060×; oregana, 1061; trachycarpa, 1061.
Protea argentea, 1847×; Family, 27; grandiflora, 27.
Proteaceæ, 27.
Protium braziliense, 279.
Protocitrus, 1270.
Provincial horticultural societies, 1553.
Pruinosæ (Cratægus), 882×.
Prumnopitys elegans, 2725; spicata, 2725; taxifolia, 2725.
Prunella, 581.
Prunier d'Espagne, 3217.
Prunophora, 2824.
Prunopsis Lindleyi, 2831×.
Prunus Amygdalus, 2303×; caroliniana, 1440×; Pseudo-Cerasus, 3602; serotina, 41.
Prussic acid, 249×.
Psamma, 274×.
Psedera, 2477×.
Pseudægle sepiaria, 2751×; trifoliata, 2751×.
Pseudanemone(Clematis),792×.
Pseudocydonia sinensis, 727×.
Pseudodracontium Lacourii, 276×.
Pseudolysimachia (Veronica), 3449×.
Pseudo-Martagon (Lilium), 1875.
Pseudophœnix Sargentii, 2445×.
Pseudoregelia (Iris), 1673.
Pseudosassafras Tsumu, 3082.
Pseudotsuga Davidiana, 1737×; jezoensis, 1737×; taxifolia vars., 3574.
Psidium Guajava, 60×.
Psilanthemum, 1118.
Psoralea esculenta, 41×; hypogæa, 41×.
Psychotria Ipecacuanha, 714; leucocephala, 3035×.
Psyllíostachys (Limonium), 3232×.
Ptæroxylon obliquum, 45×.
Ptarmica, 205×.
Pteridium, 3602; aquilinum, 1217×.
Pteridophyta, 7.
Pterilomioideæ (Scutellaria), 3123.
Pteris, 1215×, 3602.
Pterocarpus, 42.
Pterocarya fraxinifolia, 2303×.
Pteroclados(Limonium),3230×.
Pteroneuræ (Euphorbia), 1170.
Ptilotus exaltatus, 3373×.
Ptychoraphis singaporensis, 3571.
Ptychosperma alba, 1004×; Alexandræ, 385; Cunninghamii, 385; elegans, 385; Kuhlii, 2626; Macarthuri, 2445×; paradoxa, 2856; Seemannii, 442×; singaporensis, 3571. See also 3602.
Puccoon, 1893; Red, 3069×.
Pucha-pat, 2726×.
Pudding-Pipe Tree, 680×.
Puka, 2040.
Pulassan, 2131.
Pulay, 904×.
Pulmonaria maritima, 2039; officinalis, 69.
Pulque, 20×, 231, 234×.
Pulsatilla hirsutissima, 284×; vernalis, 284×; vulgaris, 285.
Pumpkin, Art, 2060.
Punctatæ (Cratægus), 884×.
Punicaceæ, 59×.
Punk Tree, 2022×.
Purdy, A. M., 1592.
Purging Croton, 902; Nut, 1720.
Purple Apricot, 2824×; Bells, 2930×; Bent-Grass, 617; -Cane Raspberry, 3028×; Chokeberry, 396×; Cone-Flower, 1087×; -disk Sunflower, 1448×; -King, 1672×; Loosestrife, 1937×; Mulkein, 3443×; Osier, 3054×; Ragwort, 3150×; Rock-Cress, 429; Vetch, 3466; Wreath, 2563.

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Purslane, 2766; Family, 30×; Sea, 427×; Water, 1920; Winter, 2065.
Pusætha, 1115×.
Pusley, 2766×.
Pussy's Toes, 299.
Pussy Willow, 3053×.
Putty Root, 311.
Puya heterophylla, 2651.
Pycnocoma macrophylla, 2303×.
Pycnoloba (Primula), 2792×.
Pycnosphace (Salvia), 3065.
Pyramidata (Verbascum), 3443.
Pyrethrum aureum, 756; Balsamita, 757; caucasicum, 733; corymbosum, 755×; fœniculaceum var. bipinnatifidum, 756×; hybridum, 757; inodorum, 2010×; Pallasianum, 758×; Parthenium, 756; roseum, 757; uliginosum, 758.
Pyrola, One-flowered, 2061×; uniflora, 2061×.
Pyrolaceæ, 63×.
Pyrolirion, 3543×.
Pyrophorum, 2867×.
Pyrrheima Loddigesii, 3363×.
Pyrularia pubera, 2303×.
Pyrus americana, 3195; arbutifolia, 396×; arbutifolia var. nigra, 396×; Aria, 3197; Aria var. latifolia, 3196×; Aria var. majestica, 3197; Aucuparia, 3195×; caloneura, 3197×; cathayensis, 727×; Chamæmespilus, 3198; crenata, 3198; Cydonia, 936; Decaisneana, 3197; Delavayi, 1063; discolor, 3198; domestica, 3196; Doumeri, 1063; edulis, 3197; fennica, 3196; floribunda, 396×; Folgneri, 3197×; Folgneri var. pendula, 3197×; fusca combinations, 3574; gracilis, 3198; grandifolia, 396×; heterophylla, 3196×; Hostii, 3198; indica, 1063; intermedia, 3197; intermedia var. latifolia, 3196×; japonica, 728; lanata, 3198; Matsumurana, 3198; Maulei, 728×; Miyabei, 3197×; Mougeotii, 3198; nigra, 396×; pinnatifida, 3196; rotundifolia, 3196×; sambucifolia, 3195×; sinensis, 727×; sitchensis, 3195×; Sorbus, 3196; thianschanica, 3196; thuringiaca, 3196×; torminalis, 3196×; vestita, 3198.
Pythium de Baryanum, 5×.
Pyxie, 2878×.

Quadria heterophylla, 1335.
Quaker Lady, 1611.
Quaking Grass, 576.
Quamasia, 639×.
Quarantine laws, 1650×.
Quarter-Vine, 503.
Quassia, 67; amara, 45; Family, 44×; Wood, 45.
Quauhtzapotl, 294.
Quebec, 566.
Queen Anne's Pocket Melon, 908; Lily, 917; Mary's Thistle, 2354; of Lilies, 1870; of Orchids, 1372; of the Meadow, 3214×; of the Meadows, 1239×; of the Prairie, 1239.
Queen's Delight, 3242×; -Root, 3242×.
Queensland-Lily, 1067; Nut, 1939; Poplar, 1499; Pittosporum, 2654×.
Queltia fœtida, 2110×; juncifolia, 2111; orientalis, 2112.
Quercitron, 25×.
Quercus, 25×; alba, 358; bicolor, 358; cleistocarpa, 3569×; coccinea, 358; cornea, 2479×; cuspidata, 2479×; densiflora, 2479; glabra, 2479×; Henryi, 3569×; laurifolia, 358, macrocarpa, 358; Michauxii, 358; nigra, 358; palustris, 358; phellos, 358; Prinus, 3603; rubra, 358; thalassica, 2479×; virginiana, 358.
Quesnelia Van Houtteana, 1098.
Quillaja Saponaria, 41.
Quinaria, 2477×; Lansium, 786.
Quince, Japan, 728.
Quinine, 774×.
Quinoa, 737.

Rabbit-foot Clover, 3379.
Raccoon Grape, 3487.
Radicula Armoracia, 36×, 2981×; Nasturtium-aquaticum, 36×, 2981×.
Radix Anatheri, 3456; Galangæ minoris, 265×; Vetiveriæ, 3456.
Raffia Palm, 2910×.
Ragan, Reuben, 1592; W. H., 1592.
Ragged Orchis, 1424×; Robin, 1929; Sailor, 711×.
Rag Gourd, 1921; -weed, 271×; -wort, Golden, 3151×; -wort, Purple, 3150×; -wort, Tansy, 3152.
Raimannia, 2330×.
Rainbow Cactus, 1095; Moss, 3138.
Rain Tree, 3066×.
Raisin Tree, Japanese, 1611×.
Rais Colorada, 3037.
Rambutan, 2131.
Ramero, 3377.
Ramo de oro, 1312.
Ramona, 430.
Ramontchi, 1241.
Rampion, Horned, 2612.
Ram's Foot, 2909×.
Rand, E. S., 1592×.
Rangoon Creeper, 2894×.
Ranunculaceæ, 32.
Ranunculus sceleratus, 32×; Thora, 32×.
Rapanea guyanensis, 2095×.
Rape, 2910.
Raphanistrum, 2910.
Raphanus Raphanistrum, 36×; sativus, 36×.
Raphidophora, 2925×.
Rapunculus verus, 643×.
Raspberries, history, 1515×.
Raspberry, European, 3028; Fire, 3024×; Flowering, 3024×; Purple-Cane, 3028×; Red, 3028; Rocky Mountain Flowering, 3024×.
Rata, 2044×; Mountain, 2045.
Ratibida columnaris, 1840×; pinnata, 1841.
Rat-stripper, 2424×; -tail Cactus, 312×.
Rattan, 16×.
Rattle-box, 901×, 1920.
Rattlesnake Master, 1138; Plant, 623; Plantain, 1357; Root, 2781×; Weed, 1491.
Ravenala madagascariensis, 21×.
Ravenea Hildebrandtii, 2905.
Ravenna-Grass, 1129.
Rawson, W. W., 1593.
Rasoumofskya, 2595.
Reana luxurians, 1161×.
Reasoner, P. F., 1593.
Rectæ (Clematis), 795; (Stachys), 3220×.
Red Ash, 1275×; Baneberry, 212×; Bay, 2556; -berried Elder, 3068; -berry, 2924×; Birch, 497×; -bird Cactus, 2524×; Box, 1152×; Buckeye, 228; -Bud, 720; Campion, 1928; Cedar, 1728×; Chokeberry, 396×; Clover, Common, 3379×; Cluster Pepper, 659; Currant, 2960; Currant, Northern, 2960; Currant, Swamp, 2959×; Elm, 3410×; Fescue, 1228×; Fir, 174×, 2847; Grape, 3486×; Gum, 1158; -hot Cat-tail, 191; -hot-poker Plant, 1751×; Ironbark, 1153, 1159; Ironwood, 2922×; Jamaica Banana, 2078×; Kowhai, 802×; Mahogany, 1156; Maids, 618; Maple, 202×; Mulberry, Native, 2071; -Osier Dogwood, 852×; Passion-Vine, 2486; Pepper, 658×; Pine, 2640; Pine, Japanese, 2640; Puccoon, 3069×; Raspberry, 3028; Robin, 1331; -Root, 269×, 1893×; Sandal-wood Tree, 215; Spanish Banana, 2078×; Spruce, 2619; Valerian, 713×; -White-and-Blue Flower, 914; -wood, 3163×.
Reed, 403×; Bur-, 3200×; Canary-Grass, 2573×; Common, 2601×; Giant, 403×; Mace, 3405×; Meadow-Grass, 1351×; Paper-, 2472×; Sea Sand-, 274×; Spire-, 2601×.
Refrigeration, 3245×.
Regelia (Iris), 1673.
Reidia glaucescens, 2606×.
Rein Orchis, 1423.
Rescue-Grass, 579.
Reseda, 1831; Luteola, 37; odorata, 37.
Resedaceæ, 37.
Resin, Dammar, 12×, 230×; Kauri, 12×; Myrrh, 45×; Sandarac, 12×.
Rest-Harrow, 2353.
Resurrection Fern, 2744×; Plant, 3140.
Retama monosperma, 1322.
Retinospora, 1440×; dubia, 3335×; ericoides, 730×, 3335×; filifera, 731×; juniperoides, 3337; leptoclada, 730×, 732; obtusa, 731; obtusa aurea, 731; pisifera, 731×; plumosa, 731×; plumosa aurea, 732; Sanderi, 731; squarrosa, 732. See also 3603.
Rhamnaceæ, 51.
Rhamnus cathartica, 51, 1440×; Paliurus, 2436×.
Rhaphanus, 2910.
Rhapidophyllum, 2445×.
Rhapiolepis, 2911.
Rhapis, 2445×.
Rhapontic Roots, 61.
Rheumatism-root, 1720×.
Rheum officinale, 28×; Rhaponticum, 28×.
Rhineberry, 2924.
Rhinopetalum, 1280.
Rhipidodendron dichotomum, 200×; distichum, 260×; plicatile, 260×.
Rhipsalis cereiformis, 2566; ianthothele, 2566; salicornioides, 1433.
Rhisophoraceæ, 59×.
Rhizopus nigricans, 5×.
Rhodanthe alba, 1453×; atrosanguinea, 1453×; maculata, 1453×; Manglesii, 1453; varius, 1453×.
Rhodea, 2974×.
Rhode Island, 2162.
Rhodes Grass, 750×.
Rhodiola rosea, 3129×.
Rhodochlamys, 2079.
Rhodocistus Berthelotianus, 778.
Rhododendron amœna, 1439×; arbutifolium, 3571; austrinum, 3571; Chamæcistus, 2949×; lætevirens, 3571; oleifolium, 3571; various new combinations, 3574; Wilsonianum, 3571; Wilsonii, 3571.
Rhodophyceæ, 5.
Rhodora canadensis, 2943.
Rhoicissus capensis, 3482×.
Rhopala, 3020×.
Rhopalostylæ (Potentilla), 2773.
Rhubarb, Guatemala, 1720.
Rhus Coriaria, 48; cotinoides, 865; Cotinus, 864×; rhodanthema, 2949; succedanea, 48.
Rhynchospermum jasminoides, 3361×.
Rhynchospora, 3041×.
Rhytidophyllum floribundum, 1333×.
Ribbon-Grass, 2574; Tree, 2655; -wood, 2655×.
Ribes, 39; Culverwellii var. wollense, 3571; new combinations, 3574.
Ribwort, 2656×.
Ricciales, 6×.
Rice, 2411; Bean, 2575×; Field Water-Lily, 2313×; -Flower, 2624; Indian, 3546×; Mountain, 2411; Paper, 1204; -root Lily, 1281×; Wild, 3546×.
Richardia Adlamii, 3536×; æthiopica, 3536×; africana, 3536×; albo-maculata, 3536; angustiloba, 3536×; aurata, 3536×; cantabrigiensis, 3536×; devoniensis, 3536×; Elliottiana, 3536; hastata, 3536×; intermedia, 3536×; Lathamiana, 3536×; Lutwychei, 3536×; macrocarpa, 3536×; melanoleuca, 3536; melanoleuca var. tropicalis, 3536; nana compacta, 3536×; Pentlandii, 3536×; Rehmannii, 3536; Sprengeri, 3536; suffusa, 3536×; Taylori, 3536×.
Ricinella, 214×.
Ricinus communis, 46×.
Riddellia tagetina, 2849.
Rissoa ceylonica, 426×.
Rivea tiliæfolia, 391.
Riverbank Grape, 3486; Birch, 497×; Poison, 1189.
Rivina peruviana, 3377.
Robertsonia (Saxifraga), 3096.
Robin-run-away, 2130×.
Roccardia corymbiflora, 1453×; Humboldtiana, 1453×; Manglesii, 1453; Manglesii var. maculata, 1453×; rosea, 1453×.
Rocella tinctoria, 6.
Rochea falcata, 878.
Rock Beauty, 1068×; -Brake, 903×; Chestnut Oak, 2886×; -Cress, 343; -Cress, Purple, 429; Elm, 3410; Grape, 3485; Jasmine, 282×; Maple, 203; Melon, 908×; Rose, 776×; -Rose Family, 55.
Rocket, 1479; Candytuft, 1635×; -Salad, 1137×; Yellow, 454.
Rock, John, 1593.
Rocky Mountain Bee-Plant, 799; Flowering Raspberry, 3024×.
Rodetia Amherstiana, 526.
Roeding, F. C., 1593×.
Roettlera, 1005.
Roeslia bulbifera, 1305×; regia, 1305; regina, 1305.
Roffia Palm, 2910×.
Rogers, E. S., 1593×.
Rogiera amœna, 2980; cordata, 2980; gratissima, 2980; latifolia, 2980; versicolor, 2980.
Rollinia leptopetala, 2978; parviflora, 2978.
Roman Kale, 496×; Wormwood, 400.
Root Blossom, Scarlet, 229.
Ropala, 3020×.
Roripa Armoracia, 2895×; Nasturtium, 2895×.
Rosaceæ, 40.
Rosa damascena, 41; de Montana, 304×; gallica, 41; Mundi, 2989; rubiginosa, 1440×; rugosa, 1440×; various new combinations, 3574.
Rosanowia conspicua, 3170; ornata, 3170.
Roscheria, 2445×.
Roscoea gracilis, 695; lutea, 695.
Roscyna (Hypericum), 1630×.
Rose Acacia, 2967×; Anemone, 2997; -Apple, 1163; Ayrshire, 2987; Banks', 2988×; Bay, 2139; -Bay, East Indian, 3304; Bengal, 2988; Bourbon, 2988×; Bridal, 3029; Brier, 3029; -Bud Cherry, 2841; Burgundian, 2989×; Cabbage, 2989; California, 839; Calla, 3536; Campion,

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Rose, continued.
1928; Champney, 2988; Cherokee, 2996×; China, 2988; Christmas, 1454×; Cinnamon, 2993; Confederate, 1488; Cotton-, 1335×, 1488; Crimson Chinese, 2988; Crimson Rambler, 2985; Damask, 2989×; Dawson, 2985; Dog, 2990×; Fairy, 2988; Family, 40; Fortune's Double Yellow, 2987×; Geranium, 2533; Green, 2988; Guelder, 3462×; Harison's Yellow, 2995×; Himalayan Musk, 2985×; Japanese, 1736×; Macartney, 2996×; -Mallow, 1483×; -Mallow, Crimson-Eye, 1486×; -Mallow, Swamp, 1486×; Memorial, 2986×; Moss, 2766, 2989; Mountain, 304×; Musk, 2986; Noisette, 2988; of Heaven, 1928; of Jericho, 2920; of Sharon, 1488×, 1630×; Persian Yellow, 2995×; Pompon, 2989×; Prairie, 2985×; Rock, 776×; Scotch, 2995; Seven Sisters, 2985; Sulphur, 2995×; Sun, 1444; Tea, 2987×; -wnter, 41; -wood, 42; -wood, Burmese, 2853×; York and Lancaster, 2989.
Roselle, 1485.
Rosemary, 70, 912, 3020; Victorian, 3512; Wild, 1833.
Rosenbergia Pringlei, 807; scandens, 806×; stipularis, 807.
Rosette Mullein, 2903×.
Rosin, 1417×; -weed, 3168×.
Rosmarinus officinalis, 70, 912.
Rosoglio, 38×.
Rosulati (Streptocarpus), 3273×.
Rottlera japonica, 1972×.
Rotundifoliæ (Cratægus), 883.
Rouge Plant, 2966.
Rough-stalked Meadow-Grass, 2723×.
Roulinia gracilis, 966; Karwinskiana, 2147×; serratifolia, 966.
Round Kumquat, 1270; -leaved Mint, 2035.
Roupellia grata, 3277×.
Rowan Tree, 3195×.
Roxburghia gloriosa, 3235; glorioseoides, 3235; viridiflora, 3235.
Royal Catchfly, 3167; Fern, 2413×; Jasmine, 1718×; Palm, 2405; Poinciana, 2727; Water-Lily, 3466×.
Roystonea Borinquena, 2405; floridana, 2405; oleracea, 2405; regia, 2405.
Rubacer, 3021; columbianum, 3024×; odoratum, 3024×; parviflorum, 3024×.
Rubber, Brazil, 1482×; Guayule, 2477×; Plant, 1229; Tree, Para, 1482×; Tree, South American, 1482×; Virgin, 3072×.
Rubia tinctoria, 74×.
Rubiaceæ, 74×.
Rubra (Acer), 202×.
Rubus Dalibarda, 961; odoratus albidus, 3574; procumbens var. roribaccus, 3574; rosæflorus, 3604.
Ruby-Grass, 3374×.
Rudbeckia purpurea var. serotina, 1088; serotina, 1088.
Rue, 912, 3041×; Anemone, 3296×; Family, 44×; Goat's 3321×; Meadow, 3326; Tall Meadow, 3327×.
Ruellia ciliosa, 73×; colorata, 1457×.
Ruizia fragrans, 2565×.
Rulac Negundo, 204×.
Rumex crispus, 28×.
Running Blackberry, 3032; Myrtle, 3471; -Pine, 1932.
Rupala, 3020×.
Rupture-wort, 1477×.
Ruscus androgynus, 3142×; racemosus, 961×.
Rush, 1724×; -Broom, Leafless, 3470×; Family, 19; Flowering, 601; Lily, 3171; Wood, 1924.
Russell River Lime, 2047×.
Russian Almond, 2832; fruits, 1297×; Mulberry, 2079×; Thistle, 3057; Vetch, 3466.
Rustica, 2143.
Rustic work, 2675.
Rutaceæ, 44×.
Ruta graveolens, 912.
Rutland Beauty, 839×.
Ruyschiana spicata, 1071.
Rydbergia grandiflora, 212×.
Rye, 3124; -Grass, 1902×, 3568; -Grass, Giant, 1111×; Wild-, 1111.

Sabal, 2445×; serrulata, 17.
Sabina, 1727×.
Sacaline, 2743.
Sacaton, 3217×.
Saccharina (Acer), 203.
Saccharomyces, 5×.
Saccharum officinarum, 15.
Sacci, 232×.
Saccolabium Blumei, 2955×; cœleste, 2956; giganteum, 3431×; guttatum, 2955×; Harrisonianum, 2956; præmorsum, 2955×; retusum, 2955×; Rheedii, 2955×; violaceum, 2955×.
Sacred Earflower of the Aztecs, 938.
Safflower, 675.
Saffron Crocus, 899×; False, 675; Meadow, 824×.
Sage, 912; Bethlehem, 2857; Brush, 399, 400; Jerusalem, 2585×; -leaved Pear, 2868; Scarlet, 3063; White, 400.
Sago Palm, 932×; Palm, 2045.
Sainfoin, 2353.
St. Agnes' Flower, 1849; Andrew's Cross, 405; Augustine Grass, 3237; Bernard's Lily, 300; Bruno's Lily, 2473; George's Herb, 3426×; John's Bread, 717×; John's Lily, 893; John's-Wort, 1629; John's-Wort Family, 54×; John's-Wort, Marsh, 1632×; Joseph's Lily, 1868×; Julien Plum, 2826; Lucia, 2356×; Lucie Cherry, 2835×; Lucie Grass, 939×; Mary's Guacima, 3526×; Mary's Thistle, 3169; Patrick's Cabbage, 3096; Paul's Speedwell, 3451; Peter's-wort, 405; Thomas Tree, 457×.
Saintfoin, 2353.
Salal, 1319.
Salamander Tree, 304.
Salep, 23.
Salicaceæ, 24.
Salisburia adiantifolia, 1338×.
Salix, 24; acutifolia, 3572×; alba var. cærulea, 3571×; alba var. calva, 3571×; ambigua, 3572; appendiculata, 3572; aurita, 3572; austriaca, 3572; bicolor, 3572×; bullata, 3571×; canescens, 3571×; cinerea, 3571×; cinerea var. angustifolia, 3571×; cinerea var. oleifolia, 3571×; cremensis, 3571×; daphnoides, 3572×; daphnoides var. acutifolia, 3572×; Erdingieri, 3571×; Erdingieri var. cremensis, 3571×, 3574; Forbyana, 3573; fragilis var. bullata, 3571×; fragilis var. decipiens, 3571×; glabra, 3572×; gracilistyla, 3573; grandifolia, 3572; hastata, 3572×; hexandra, 3571×; holosericea, 3572×; Læstadiana, 3571×; latifolia, 3571×; ludificans, 3572; myrsinifolia, 3572; neriifolia, 3572; nigricans, 3572; palustris, 3571×; phylicifolia, 3572×; Piperi, 3572×; Pontederana, 3572; purpurea var. amplexicaulis, 3573; purpurea var. Kecksii, 3573; purpurea var. Lambertiana, 3573; purpurea var. sericea, 3573; Reuteri, 3572×; rubens, 3571×; rubens var. palustris, 3571×; rubra, 3573; Russelliana, 3571×; sesquitertia, 3572; Sieboldiana, 3573×; sordida, 3572; spadicea, 3572; stipularis, 3572×; tetraptera, 3572×; Thunbergiana, 3573; viminalis var. Gmelinii, 3572×; viminalis var. songarica, 3572×; viridis, 3571×; Wimmeri, 3572×; Wimmeriana, 3571×.
Salmonberry, 3023×, 3026×.
Salpichroma rhomboideum, 3055×.
Salsify, 3365; Black, 3121.
Salt-Bush, 436; -Grass, 1061; Tree, 1429×.
Salvia Sclarea, 911×; officinalis, 70, 912.
Salviniaceæ, 10, 1209.
Saman, 3066×.
Sambucus canadensis, 75; japonica, 1176; nigra, 75.
Samphire, 896, 912; Marsh, 3050.
Sanctolina, 3071.
Sandalwood, 3071; Bastard, 2090×; False, 3525; Family, 27×; Red, 42; Tree, Red, 215.
Sandarac, 1417×; Resin, 12×.
Sandarach, 631.
Sand Blackberry, 3031×; -box Tree, 1615×; -Bur, 711; Cherry, 2833×; Clover, 303×; Grape, 3485; Lily, 1848×; Myrtle, 1835; Pear, 2869; Pine, 2644; Plum, 2829×; -Reed, Sea, 274×; Verbena, 175×; Vetch, 3466.
Sanguineæ (Cratægus), 886.
Sanguisorba obtusa, 2776×.
Sanicle, 3070.
San Miguelito, 304×.
Sanseverina rorida, 3070×.
Sansevieria fragrans, 1070.
Santa Domingo Apricot, 1975×.
Santalaceæ, 27×.
Santalum album, 27×.
Santonica, 399.
Santonin, 77.
Sapindaceæ, 50.
Sapindus chinensis, 1756; Saponaria, 50×.
Sapium sebiferum, 47, 2303×.
Sapodilla Family, 65.
Saponaria officinalis, 31×.
Saponin, 29, 31×, 3072.
Sapotaceæ, 65.
Sapote, 1919; Mamey, 1919.
Sapotillier, 3073×.
Saprolegnia, 5×.
Sapucaya Nut, 1832×.
Sararanga, 2449.
Sarcochilus Cecilæ, 3334; Hartmannii, 3334; lilacinus, 3334×; purpureus, 639×.
Sarcodes sanguinea, 64.
Sarcopodium, 2403.
Sarcostemma, 2583.
Sardonia, 32×.
Sargassum bacciferum, 5.
Sargent, H. W., 1594.
Sarothamnus scoparius, 948.
Sarracenia purpurea, 37×.
Sarraceniaceæ, 37×.
Sarsaparilla, 19×; Bristly, 344×; Wild, 344×.
Saskatchewan, 570×.
Sassafras, 35×; variifolium, 35×.
Satin-Bush African, 2724; Flower, 1921×, 3171; -Leaf, 767; Poppy, 2017×; -wood, 2076; -wood, Indian, 751×.
Satsuma Orange, 784×.
Satureia nortensis, 912; montana, 912.
Saul, John, 1594×.
Saunders, Wm., 1594×.
Saururaceæ, 23×.
Sausage-Tree, 1738.
Savastana odorata, 1491×.
Savin, 1728×.
Savory, 3082; Summer, 912, 3082×; Winter, 912, 3082×.
Sawara Cypress, 731×.
Saw-Brier, 3174×; -fly Orchis, 2356; Palmetto, 3156×.
Saxegothæa gracilis, 2725.
Saxifraga pyrolifolia, 1841×; Sullivantii, 3281.
Saxifragaceæ, 39.
Saxifrage Family, 39; Golden, 767×; Meadow, 3157×.
Scabiosa Pterocephala, 2854×; Succisa, 3280×.
Scabious, 3105×; Sheep, 1716×; Shepherd's, 1716×; Sweet, 3106.
Scammony, 68×.
Scarborough Lily, 3428.
Scarlet Bush, 1431×; Clover, 3379; -flowering Rose Geranium, 2533; Fritillary, 1281×; Lightning, 1927×; Maple, 202×; Oak, 2883×; Plume, 1169×; Root Blossom, 229; Runner Bean, 2576; Sage, 3063; Strawberry, 1272; Turk's-Cap Lily, 1874; Vetch, 3465×.
Schæfferia lateriflora, 1080.
Scheeria lanata, 208; mexicana, 208.
Schinus Limonia, 1219.
Schivereckia podolica, 269.
Schizæa pusilla, 9.
Schizæaceæ, 9, 1208×.
Schizonotus, 1498.
Schizophragma hydrangeoides, 1623.
Schmaltzia aromatica, 2953; copallina, 2954; crenata, 2953; glabra, 2954×; hirta, 2954×; Michauxii, 2954×; trilobata, 2953.
Schœnocaulon officinalis, 19×.
Schomburgkia, 2403.
Schrader's Brome-Grass, 579;
Schubertia disticha, 3314×; graveolens, 2610.
Sciadocalyx, 1705×.
Sciadophyllum acuminatum, 3108×; Brownii, 3108×; conicum, 3108×.
Scillopsis, 1764×.
Scindapsus pertusus, 2925×.
Scirpus lacustris, 16.
Sclarea (Salvia), 3060.
Scleroderma vulgare, 2088×.
Sclerotylis buxifolia, 3158×; Hindsii, 1270; spinosa, 2038×.
Scoke, 2614.
Scolopendrium officinarum, 2607; vulgare, 2607.
Scolymus hispanicus, 77×.
Scoparia dulcis, 71.
Scopolia carniolica, 70×.
Scorodonia (Teucrium), 3325.
Scorodosma fœtidum, 1228.
Scorpion Grass, 2091; Senna, 855×.
Scorsonera, Creole, 871×; hispanica, 77×.
Scotanthus tubiflorus, 1420×.
Scotch Broom, 948; Crocus, 898×; Elm, 3410×; Laburnum, 1763×; Pine, 2640×; Pink, 998×; Rose, 2995; Thistle, 2354.
Screen-planting, 2681×.
Screw-Bean, 2811; -Pine, 2449; -Pine Family, 13.
Scrophulariaceæ, 71.
Scrophularia nodosa, 71.
Scrub Oak, 2884×; Palmetto, 3045; Pine, 2644.
Scurfy Pea, 2849.
Scurvy Grass, 454, 809.
Scutch Cane, 446.
Scutellaria lateriflora, 70.
Scutellatæ (Veronica), 3452×.
Scytalia chinensis, 1891×.
Scythian Lamb, 768×.
Sea Buckthorn, 1494×; -Daffodil, 1626; -Grape, 807×; -Holly, 1137×; -Kale Beet, 496×, 734; Lavender, 3229×; Lyme-Grass, 1111×; Oats, 3414×; -Onion, 3118×, 3417; Pea, 1826; Pink, 395, 3228; Poppy, 1346×; Purslane, 427×; Sand-Reed, 274×; Urchin, 1428; -Urchin Cactus, 1097.
Seaforthia elegans, 385; Kuhlii, 2626; robusta, 2950.
Seaside Balsam, 902; Laurel, 2606×; Pea, 1826; Planting, 2670×; Plum, 3525; Vine, 776×.
Seaweeds, Brown, 5; Red, 5.
Sedangan, 1896.
Sedge, 662, 3119; Broom, 282×; Family, 15×.
Sedum Cotyledon, 871; ebracteatum, 3125; edule, 869×; Telephium, 38×.

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Seed-box, 1920; business, history, 1516×.
Sego Lily, 635.
Selaginella, 11, 1215×; Family, 10×; lepidophylla, 2920×.
Selaginellaceæ, 10×.
Selenipedium Ainsworthii, 2604; albopurpureum, 2604; Boissierianum, 2603×; caricinum, 2603; caudatum, 2603×; caudatum var. Warscewiczii, 2603×; Hartwegii, 2603×; Klotzschianum, 2603; Lindleyanum, 2603; Roezlii, 2603×; Sargentianum, 2603; Schlimii, 2602×; Schomburgkianum, 2603; vittatum, 2603; Wallisii, 2603×.
Self-Heal, 581.
Semecarpus Anacardium, 2304.
Sempervivum tectorum, 38×; tenuifolium, 3127×.
Sencuya, 292×.
Seneca-Grass, 1491×; Snakeroot, 2738.
Senecio japonicus, 1859; Kaempferi, 1858×; Ledebourii, 1859; Ligularia, 1859; longipes, 2291; sagittatus, 1112; sibiricus, 1859; sonchifolius, 1112.
Senegal Gum, 1417.
Seni, 1915.
Senna, 680; Bladder, 834; Scorpion, 855×.
Sensitive Brier, 3115; -Fern, 2353; Pea, 680×; Plant, 2053×.
Serapias, 1357×.
Serapiastrum, 3156.
Serenoa, 2445×.
Sericeæ (Rosa), 2996.
Sericobonia, 1714.
Sericographis Ghiesbreghtiana, 1715; Mohintli, 1715; pauciflora, 1715.
Sericotheca Boursieri, 1498×; discolor, 1498×.
Seringa, 1483.
Seringueira, 1482×.
Serjania lethalis, 50×.
Serpentaria, 28×.
Serpent Gourd, 3376; -head Orchid, 3223.
Serradella, 2409×.
Serratula tinctoria, 77×.
Serrulatæ (Furcræa), 1305.
Service-berry, 272, 273×; Tree, 3196; Tree, Wild, 3196×.
Sesame-Grass, 3383×.
Sesamum indicum, 72.
Seven Sisters Rose, 2985.
Seville Orange, 782×.
Shad-bush, 272.
Shagbark, False, 677.
Shaggy Hawkweed, 1491.
Shallon, 1319.
Shamrock-Pea, 2475×.
Sharp, F. P., 1595×.
Shaw, Henry, 1595×.
Shea Butter, 65×.
She Balsam, 174; -Oak, 683×.
Sheep-Berry, 3459×; -Laurel, 1734×; Scabious, 1716×; Sorrel, 3037×.
Sheep's-bit, 1716×; Fescue, 1228×.
Shellac, 26×.
Shellbark-Hickory, 678.
Shell-Flower, 265×, 2059×, 3344×.
Shepherdia argentea, 59.
Shepherd, R. W., 1596; Mrs. T. B., 1596×.
Shepherd's Scabious, 1716×.
Sherwoodia galacifolia, 3160; uniflora, 3160×.
Shifting, 2778.
Shingle Oak, 2885; Plant, 2064×.
Shining Sumac, 2954.
Shin Leaf, 2864; Family, 63×.
Shinn, James, 1596×.
Shirley Poppy, 2457×.
Shirt-button Plant, 1974×.
Shittim Wood, 179.
Shoeblack Plant, 1488.
Shooting-Star, 1063.
Shore-Grape, 807×; Plum, 2831.
Shortia californica, 213×.
Show Geranium, 2532×.
Showy Lily, 1870×; Orchis, 1311×; Sedum, 3131×; Sunflower, 1449×; Wild Pea, 1826.
Shrubby Althea, 1488×.
Shrub Yellow-Root, 3537.
Siberian Apricot, 2824×; Crab, 2871×; Cranesbill, 1332; Millet, 3158×; Rye-Grass, 3568; Squill, 3118×.
Sibthorpia europæa, 1624×.
Sicilian Beet, 496×.
Sida integerrima, 178×.
Side-Saddle Plant, 3078×.
Sierra Leone Copal, 1417.
Sieva Bean, 2577.
Sieversia ciliata, 1335; Peckii, 1334×.
Silene Cœli-rosa, 1928.
Silk-Cotton, 700; Cotton Tree, 521; -Grass, 1306×; Oak, 1412; -Vine, 2553×; -weed, 404.
Silky Prairie Clover, 2561×; Willow, 3054; Wisteria, 3518.
Silver Beard-Grass, 282×; -Bell, 1428×; -berry, 1106×; -Bract, 870; Chickweed, 2476; Fir, 173; -head, 2476; -leaved Cranesbill, 1331; -leaved Ironbark, 1152×; Maple, 202×, 2756; -Palm, 808; Thistle, 2354; -Tree, 1847×; Vine, 213; Wattle, 188×; Weed, 391, 2775×; Whitlowwort, 2476.
Silvery-leaved Sunflower, 1447×.
Simarubaceæ, 44×.
Simaruba Cedron, 45.
Simbulata, 280×.
Simon Plum, 2827.
Simplicifoliæ (Rosa), 2984×.
Sinapis arvensis, 544×.
Sinapistrum arvense, 544×.
Sinenses (Primula), 2791×.
Singhara-Nut, 3372.
Sing-kwa, 1921.
Sinningia barbata, 3310×; Carolinæ, 3310×; speciosa, 1350.
Siphonantha (Limonium), 3232×.
Siphonanthus indica, 801; splendens, 800.
Siphonia Cahuchu, 1483; elastica, 1483.
Siris Tree, 243×.
Sisal, False, 232×; Hemp, 232×.
Sisson Plum, 2827.
Sissoo Tree, 960×.
Sisymbrium indicum, 2981×; Nasturtium-aquaticum, 2895×, 2981×; pinnatifidum, 545×.
Sisyrinchium cyaneum, 2410×.
Sitka Spruce, 2620; Willow, 3055.
Skeleton-leaved Mulberry, 2070×.
Skullcap, 3121×.
Skunk-Bush, 2953; Cabbage, 3295; Currant, 2959; Grape, 3490×.
Slash Pine, 2643.
Slender Rock-Brake, 903×.
Slime Molds, 4×.
Slipper Plant, 2524×; Spurge, 2524×.
Slippery Elm, 1279, 3410×.
Sloanea dentata, 52.
Sloe, Black, 2830×.
Slough-Grass, 3201.
Small Cane, 446; Cranberry, 3425×; -flowered Leaf-Cup, 2744; -leaved Linden, 3347; Pignut, 677; Snapdragon, 304×; Spikenard, 344×.
Smaller Bitter-wood, 3526×.
Smartweed, 2740.
Smilacina racemosa, 19×.
Smith, A. M., 1596×; W. R., 1597.
Smithiantha achimenoides, 2097; amabilis, 2097×; cinnabarina, 2097; Geroltiana, 2097×; zebrina, 2097.
Smoke-Tree, 864×.
Smooth Alder, 253; Azalea, 2942; -barked Cottonwood, 2763; -leaved Elm, 3412; Sumac, 2954×.
Smyrnium nudicaule, 1903×; Olusatrum, 245×.
Snail-Flower, 2574×.
Snails, 2019×.
Snake Cactus, 2525; Cucumber, 908; Gourd, 1774×, 3375×; -Grass, 1126; Melon, 908; Palm, 276×; -weed, 2742.
Snakeroot, Black, 3070; Button, 1138, 1852×; Canada, 404; Seneca, 2738; Virginia, 393; White, 1167; Wild, 2130×.
Snake's-Head, 1280; Iris, 1477.
Snapdragon, 304×; Large, 304×; Small, 304×.
Sneeze Weed, 1442×; -wood, 2850×; -wort, 206.
Snowball, 3462×; -ball, Chinese, 3460; -ball Japanese, 3461; -berry, 748, 3292×; -bush, 2606; -Creeper, 2765; -drop, 1308; -drop Anemone, Double, 286; -drop-Tree, 1428×; -flake, 1848×; -flake, Water, 2316×; -in-Summer, 717; -on-the-Mountain, 1169; Pear, 2868; -Plant, 3077×; Wreath, 2139×.
Snuff, Mountain, 396.
Soap-Bark Tree, 2891×; -berry, 3072; -berry Family, 50; -bush, 2148; -Plant, 751; -wort, 3074×; -wort Gentian, 1326×.
Sobralia, 2403.
Society publications, 1553.
Socotrine Aloes, 255×.
Soirea, Blue, 679.
Soja Bean, 1352; max, 1352.
Solanaceæ, 70×.
Solanum carolinense, 70×; Dulcamara, 71; fragrans, 943; giganteum, 3573×; Lycopersicum, 1931; Melongena, 71; nigrum, 71; racemiflorum, 1932.
Soldanelloideæ (Primula), 2799.
Solea concolor, 1618.
Soledad Pine, 2645×.
Solena, 2033×.
Solenantha, 1626.
Solidago arborescens, 3152×.
Solomon's Lily, 402×; Seal, 2739; Seal, False, 3172×.
Soncoya, 292×.
Sophora japonica, 42; monosperma, 2407; platycarpa, 785×; tomentosa, 42.
Sophronitis, 2403.
Sorbaria Millefolium, 729×.
Sorbopyrus auricularis, 2868.
Sorbus arbutifolia, 396×; arbutifolia var. atropurpurea, 396×; glabra, 2596×; melanocarpa, 396×; terminalis, 2596.
Sorghum, 1497; halepense, 1497; vulgare, 1497.
Sorgo, 1497.
Sorrel, 3036×; Common Field, 3037×; French, 3037×; Garden, 3037×; Jamaica, 1485; Sheep, 3037×; -Tree, 2419×.
Souari-Nut, 678×.
Soulard Crab, 2871.
Sour Cherry, 2836×; Guisaro, 2848; Gum, 2316×; -sop, 292; sop-, Mountain, 292×; -top, 3423×; -Wood, 2419×.
South American Rubber Tree, 1482×.
South Carolina, 2223.
South Dakota, 2202.
Southern California Grape, 3488×; Cottonwood, 2759; Dewberry, 3032; Fox Grape, 3484; Gooseberry, 3422×; Pine, 2643; Red Lily, 1876; Swamp Lily, 1871×; -wood, 912.
Spanish Broom, 3201×; Fir, 174×; Grape, 3487; Heath, 1131; Iris, 1681; Jacinth, 3117×; Jasmine, 1718×; Lime, 2025×; Moss, 3350×; Oak, 2884; Oak, Swamp, 2884×; Oyster Plant, 3120×; Plum, 3217.
Sparkleberry, 3422.
Spartianthus junceus, 3201×.
Spartium multiflorum, 94?; scoparium, 948; virgatum, 1323.
Spartocytisus filipes, 948.
Spartothamnus, 948.
Spathiphyllum pictum, 2949.
Spathyema fœtida, 3295×.
Spatlum, 1851×.
Spatter-Dock, 2291×.
Spatularia bryophora, 3092×; petiolaris, 3092.
Spatulum, 1851×.
Spear-Lily, 1067; -mint, 2035; -Wood, 1158×.
Spectabiles (Verbascum), 3442×.
Speedwell, 3448; Bastard, 3449×; Common, 3452×; Germander, 3452×; Mountain, 3452×; St. Paul's, 3451.
Spergula arvensis, 31×; pilifera, 3048×; subulata, 3048×.
Sphærogyne imperialis, 3352; latifolia, 3352.
Sphærostema propinquum, 3110×.
Sphærostigma, 2329×.
Sphagnales, 6×.
Sphenogyne speciosa, 3417.
Spicata (Acer), 200×.
Spice Bush, 487.
Spider Orchis, 2356; -Lily, 1626; Plant, 799; -web Houseleek, 3146; -wort, 3363; -wort Family, 18×.
Spignel, 2045×.
Spike, 70; -Grass, 991, 3414×; -Grass, Marsh, 1061.
Spiked Loosestrife, 1937×.
Spikenard, 344×; Small, 344×.
Spinach Beet, 496×; New Zealand, 3323.
Spinage, 3206×; Dock, 3036×.
Spindle Tree, 1185×.
Spinovitis Davidii, 3845.
Spiræa amurensis, 2610×; angustifolia, 1239×, 3194; arborea, 3194; ariæfolia, 1498×; Aruncus, 403; Aruncus var. astilboides, 403×, 423; astilboides, 423; Boursieri, 1498×; cæspitosa, 2563×; camtschatica, 1239; capitata, 2611; digitata, 1239; discolor, 1498×; dumosa, 1498×; Filipendula, 1239; gigantea, 1239; grandiflora, 3194; japonica, 423; Kirilowii, 3194; lævigata, 3160×; Lindleyana, 3193×; lobata, 1239; Millefolium, 729×; monogyna, 2611; opulifolia, 2610×; opulifolia var. mollis, 2611; palmata, 1239; pauciflora, 2611; pectinata, 1921; sorbifolia, 3193×; sorbifolia alpina, 3194; spp., 1441; Ulmaria, 1239×; vestita, 1239×.
Spiral Flag, 864.
Spiranthes, 1636×, 2403×; autumnalis, 23; colorata, 3236×; diuretica, 23.
Spiraria, 3213×.
Spire-Reed, 2601×.
Spirodela, 1837.
Split-Thorn Acacia, 599.
Spondias dulcis, 48×; purpurea, 48×.
Sponge, Vegetable, 1921.
Spoon-Thorn Acacia, 599.
Spotted Calla, 3536; Cranesbill, 1332; Gum, 1152×; Lily, 1876; Touch-me-not, 1642×.
Spreading Dog-bane, 311×.
Spring Adonis, 221; Beauty, 786×; Bitter Vetch, 1827; Snowflake, 1849; Squill, 3118×; Star-Flower, 3384×.

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Spruce, Black, 2619×; Colorado, 2620; Engelmann, 2620; Hemlock, 3390×; Norway, 2618; Pine, 2642×, 2644, 2645×; Red, 2619; Sitka, 2620; Tideland, 2620; White, 2619×.
Spurge, 1167; Caper, 1173; Cypress, 1173×; Family, 46×; Flowering, 1169; Indian Tree, 1170; Ipecac, 1169×; Melon, 1172×; Mountain, 2426×; Nettle, 1719×; Slipper, 2524×.
Squamaria Orobanche, 1824×.
Squash, Guinea, 1101×, 3182×.
Squaw-Berry, 2057×; Huckleberry, 3422; -Root, 1824×.
Squill, 3116, 3417; Autumn, 3117×; Bell-flowered, 3117×; Chinese, 3117×; Common Blue, 3117; Dwarf, 3118; Hyacinth, 3118; Italian, 3118×; Siberian, 3118×; Spring, 3118×.
Squirrel-Corn, 1002; -tail Grass, 1500×.
Squirting Cucumber, 1085.
Sredinskya (Primula), 2804×.
Stackhousiaceæ, 49.
Stackhousia Family, 49.
Stachybothys (Teucrium), 3325×.
Stachycarpus andina, 2725.
Stachymacris, 3122.
Stachyuraceæ, 56×.
Stachyurus Family, 56×.
Staff-Tree Family, 49.
Stag-Bush, 3459×; -horn Fern, 2708×; -horn Sumac, 2954×.
Stagger-Bush, 2622×.
Standing Cypress, 1337.
Stanhopea, 2403×.
Stanley's Wash-Tub, 276×.
Staphyleaceæ, 49.
Staphylea trifolia, 2304.
Star Anise, 1641; -Apple, 767; Balsam, 3532×; -fish Flower, 3226×; -Flower, 3378×; -Flower, Spring, 3384×; Gooseberry, 2606×; -Grass, 751, 1634; Hyacinth, 3118×; Ipomœa, 2879×; Jasmine, 3361×; Lily, 1877×; of Bethlehem, 1160×, 1307, 2409; of Bethlehem, Mexican, 2051; Tulip, 631×; -wort, 416.
Stark, J. H., 1597.
Starr, R. W., 1597×.
Starry Campion, 3166; Grasswort, 716×; Hyacinth, 3117×.
State horticultural societies, 1553; Mint, 2035.
Statice Araratii, 192; latifolia, 65.
Stayman, Joseph, 1597×.
Steenappel, 294×.
Steeplebush, 3215.
Steirocladæ (Limonium), 3232.
Stemless Gentian, 1328.
Stenactis speciosa, 1133.
Stenaster, 893.
Stenolobium incisum, 3317; stans, 3317.
Stenoloma tenuifolia, 2328×.
Stenomesson Stricklandii, 3276.
Stenorynchus, 2403×.
Stephanolirion, 3384.
Stephanophysum longifolium, 3036.
Sterculia acerifolia, 538×; Family, 53; platanifolia, 358.
Sterculiaceæ, 53.
Stereospermum sinicum, 2895.
Sterilizing soil, 3179×.
Stevensonia grandifolia, 2445×.
Stevia serrata, 2647×; serratifolia, 2647×.
Stick-lac, 601; -tights, 500, 939×.
Sticta pulmonaria, 6.
Stiles, W. A., 1597×.
Stillingia sebifera, 2303×, 3073; sylvatica, 47.
Stink-Grass, 1126; -wood, 35×.
Stinking Willie, 3152.
Stitchwort, Golden, 3234×.
Stock, 2011×; Intermediate, 2012; Mahon, 1972; Tenweeks, 2012; Virginian, 1972.
Stokes' Aster, 3245.
Stonecrop, 3127; -Fruits, 2822; -Mint, 912×; Pine, 2639×; Pine, Swiss, 2637; -Root, 829×; -worts, 5.
Storage-pits, 2686.
Storax, 1418, 3279×; Family, 66; Liquid, 1889×.
Stork's-Bill, 1136×, 2525.
Stramonium, 70×, 971×.
Stranvæsia amphidoxa, 2596×.
Strasburg Turpentine, 173.
Stratiotes alismoides, 2416×; nymphoides, 1624×.
Strauch, Adolph, 1598.
Stravidium, 454×.
Strawberry, Alpine, 1272×; Barren, 3496; Blite, 737; Bush, 1186×; Everbearing, 1273; Fern, 1457×; Geranium, 3093×; Guava, 2848×; Guava, Yellow, 2848×; history, 1515×; Perpetual, 1272×; Pine, 1272; Scarlet, 1272; Tomato, 2608×; Tree, 383×; Virginian, 1272; Yellow, 1080, 3486.
Streak-leaved Garlic, 2291.
Streptopus amplexicaulis, 19×.
Strictifloræ (Veronica), 3452.
Stringfellow, H. M., 1598×.
Stringybark, Peppermint, 1156; Yellow, 1155×.
Striped Maple, 202.
Strobi (Pinus), 2637×.
Strobus Strobus, 2638.
Strombocarpa pubescens, 2811.
Strong, W. C., 1598×.
Struthiopteris germanica, 2011×; spicant, 514×.
Strychnine, 67, 3278.
Strychnos, 67; potatorum, 2304.
Stubbleberry, 3182.
Stud-Pink, 1455.
Sturtevant, E. L., 1599.
Stylophyllum edule, 869×
Styphelia sapida, 64×.
Styphnolobium japonicum, 3191×.
Styraceæ, 66.
Styrax, 40, 1418; Benzoin, 66.
Sua-Kwa, 1921.
Sub-irrigation, 1684×.
Subtropical-Gardening, 2669.
Succory, 769.
Sudan-Grass, 1497; Gum, 1417.
Suffruticulosæ (Potentilla), 2773.
Sugar-Apple, 294×; Arenga, 390; -Cane, 3045×; Grape, 3485; Gum, 1157×; Maple, 203; Pea, 2650×; Pine, 2636×; -trough Gourd, 1774×.
Suirsaak, 292.
Sulphur Rose, 2995×.
Sumac, 2952; Black, 2954; Ill-scented, 2953; Mountain, 2954; Poison, 2953×; Shining, 2954; Smooth, 2954×; Staghorn, 2954×.
Summer Adonis, 221; Cypress, 1755; Fir, 400×; Grape, 3489×; Perennial Phlox, 2588; Savory, 3082×; Snowflake, 1849.
Sundew, 1077; -dew Family, 38; -Dial, 1922×; -drops, 2331; Fern, 2577×.
Sunflower, 1445×; Cucumber-leaved, 1448; Purple-disk, 1448×; Showy, 1449×; Silvery-leaved, 1447×; Swamp, 1448.
Sunn Hemp, 901×.
Sun Rose, 1444.
Sunset Plant, 3204×.
Supple-Jack, 493×.
Surinam Cherry, 1162×.
Susong-calabao, 3419×; Damulag, 398×.
Sutera brachiata, 728×.
Suttonia Lessertiana, 2095×.
Suwarro, 672×.
Svida alternifolia, 852.
Swamp Bay, 1967×; Black Currant, 2960×; Blueberry, 3423; Blueberry, Downy, 3423; Cottonwood, 2762; Dewberry, 3032; Gooseberry, 2960×; Gum, 1158×; -Hickory, 676×; Honeysuckle, White, 2942; Lily, 1871×; Locust, 1347; Loose-Strife, 974; Lousewort, 2524×; Mahogany, 1155; Maple, 202×; Oak, 2887; Pine, 2643; -Pink, 1455; Post Oak, 2887; Red Currant, 2959×; Rose-Mallow, 1486×; Saxifrage, 3092×; Spanish Oak, 2884×; Sunflower, 1448; Tea Tree, 2022×; White Oak, 2886×.
Swan-Flower, 393×; River Daisy, 539.
Swartzia tomentosa, 42.
Swedish Clover, 3379×.
Sweertia, 3291×.
Sweet Alyssum, 268×; Amber, 1632×; Bay, 1827, 1967×; Birch, 497×; -briar, 2990×; Buckeye, 227×; Cassava, 1992; Cherry, 2837×; Cicely, 2095×; Clover, 2026; Coltsfoot, 2562; Elder, 3067×; Fern, 836×; Flag, 210×; Gale Family, 24×; Goldenrod, 3188×; Gum, 1889×; Leaf, 3296; Locust, 1347; Malabar Vine, 455; Marjoram, 2406×; Mountain Grape, 3485; Pea, Golden Yellow, 901×; Pea, Wild, 3321×; Pea, Winter, 3283; Pepperbush, 802; Potato Tree, 1991×; Rocket, 1479; Scabious, 3106; -scented Candytuft, 1635×; -scented Grass, 1491×; -scented Marigold, 3305×; -scented Oleander, 2139; -scented Shrub, 637×; -scented Water-Lily, 2313; -Sop, 294×; Sultan, 712; Vernal Grass, 301; Violet, 3473; William, 998; William Catchfly, 3165; William, Wild, 2589; Winter Grape, 3487×; -wood, 35×, 902; Woodruff, 411×.
Swietenia Chloroxylon, 751×; Mahogani, 45×.
Swiss Chard, 734; Mountain Pine, 2641; Poplar, 2761×; Stone Pine, 2637.
Switch Cane, 446.
Sword Fern, 2131×; Lily, Australian, 290.
Sycamore, 1234, 2708; Maple, 201.
Sycomorus antiquorum, 1234.
Sydney Black Wattle, 188; Golden Wattle, 187×.
Symphoria conglomerata, 3293.
Symphoricarpus albus var. ovatus, 3574.
Symphytum officinale, 69.
Symplocaceæ, 66.
Symplocos, 66; Family, 66.
Synanthera, 1333×.
Syncarpiæ (Nymphæa), 2312×.
Syphocampylus, 3170×; bicolor, 1899.
Syrian Bean-Caper, 3551×.
Syringas, 1441, 2579.
Systylæ (Rosa), 2984×.
Syzygium jambolana, 1163×, 3590; operculata, 3590.

Tabacum, 2143×.
Tabernæmontana Amsonia, 279; Camassi, 1356.
Table Mountain Pine, 2643×.
Tabog, 729.
Taccaceæ, 20×.
Tacamahac, 2762×.
Tacca Family, 20×; pinnatifida, 20×.
Tachia guianensis, 67.
Tacsonia, 2480, 2485; Buchananii, 2484; erianthа, 2486; insignis, 2485×; Jamesonii, 2485×; manicata, 2486; militaris, 2486×; mixta, 2486; mollissima, 2486; Parritæ, 2485; pinnatistipula, 2487; Van Volxemii, 2485×.
Taiho-chiku, 449.
Tail-Grape, 397.
Taisan-chiku, 449.
Talauma elegans, 34; pumila, 1968.
Taligalea punicea, 271×.
Talipot Palm, 861.
Tall Cup-Flower, 2145×; Fescue, 1228×; Meadow Rue, 3327×; Morning-Glory, 1659.
Tallow Tree, Chinese, 3073; Vegetable, 3073; -wood Gum, 1155×.
Tamarack, 1822.
Tamaricaceæ, 55.
Tamarind, 3306×; Guaymochil, 2652; Huamuchil, 2652; Wild, 1935×.
Tamarindo, 3306×.
Tamarindus indica, 42.
Tamaring, Manilla, 2652.
Tamarisk Family, 55.
Tamarix algerica, 3607; dahurica, 2093×; germanica, 2093×; mannifera, 55.
Tamnus, 3309.
Tamonea magnifica, 2047; theæzans, 61.
Tampico Hemp, 1478.
Tamus communis, 21.
Tanacetum Balsamita, 757; vulgare, 77, 912.
Tanbark Oak, 2479.
Tanghinia, 67×.
Tangier Scarlet Pea, 1825×.
Tangleberry, 1320.
Tansy, 912; Ragwort, 3152.
Tape-Grass, 3428.
Taphrina, 5×.
Tapioca, 47; Plant, 1991×.
Tapira, 945.
Tarata, 2654.
Taraxacum officinale, 77.
Taraxia, 2329×.
Tare, 3464.
Tares, 1902×.
Taretra, 1306.
Tarragon, 912.
Tartago, 1720.
Tartarian Bread, 873.
Tarweed, 1964.
Tassel Flower, 559, 1112.
Tawhiwhi, 2653×.
Taxaceæ, 11×.
Taxodium heterophyllum, 1352×.
Taxus cuspidata var. densa, 3574; koraiensis, 3607.
Tea, Appalachian, 3459×; Family, 54; Labrador, 1833; Mexican, 737; Oswego, 2061; Paraguay, 1637×; Rose, 2987×; -Tree, 1843; -Tree, Swamp, 2022×.
Teak, 3318×; -wood, African, 2333.
Teasel, 1020; Family, 75.
Teas, John C., 1599.
Tecoma sæculifolia, 3303×; australis, 2452; Brycei, 2452; capensis, 3318; chinensis, 651×; chinensis aurantiaca, 652; chrysantha, 3303×; filicifolia, 651, 2452; fulva, 3318; grandiflora, 651×; grandiflora var. Princei, 652; hybrida, 652; intermedia, 652; jasminoides, 2452; leucoxylon, 3303; Mackenii, 2452; pentaphylla, 3303×; Princei grandiflora, 652; radicans, 651×; radicans grandiflora atropurpurea, 652; Reginæ Sabæ, 2452; Ricasoliana, 2452; rosea, 3303; serratifolia, 3303×; shirensis, 3318; spectabilis, 3303×; Thunbergii, 652; valdiviana, 650×.
Tectona grandis, 70.
Teel-Oil, 3157.
Teff, 1126.
Telegraph Plant, 991.
Telekia speciosissima, 599×.
Telfairia pedata, 2304.
Teline congesta, 949×; maderensis, 949; stenopetala, 949.
Temple-Flower, 2723.
Tenellæ (Primula), 2804×.
Tennessee, 2235.
Tenuifoliæ (Cratægus), 883.
Ten-weeks Stock, 2012.
Teonacastli, 938.

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Teonanacatl, 1915.
Teosinte, 1161×.
Tepary, 2576; Bean, 462×.
Tequila Mescals, 232×.
Terminalia Catappa, 60, 2304; Chebula, 60; elegans, 2747.
Ternatea vulgaris, 804.
Ternstrœmiaceæ, 54.
Terra japonica, 74×.
Terrel Grass, 1111×.
Terry, H. A., 1599.
Tetracera aspera, 53×.
Tetragonia expansa, 30×.
Tetragonolobus edulis, 1917×; purpureus, 1917×.
Tetramicra bicolor, 1844.
Tetraneuris, 212×.
Tetrapanax papyriferum, 62×, 1204.
Teucriopsis, 3325×.
Teucris, 3325×.
Teufelsabbiss, 3280×.
Texaltzapotl, 294×.
Texas, 2251×; Blue-Grass, 2723×; Millet, 2452×; Mimosa, 189; Umbrella Tree, 2024×.
Thalesia, 309, 1824×.
Thalia sanguinea, 3277.
Thalictrum anemonoides, 3296×.
Thallophyta, 4.
Thamnocalamus, 445.
Thamnopteris Nidus, 414; Nidus-avis, 414.
Thapsoidea (Verbascum), 3442×.
Thapsus (Verbascum), 3442.
Thatch-leaf Palm, 1612×; Palm, 3333.
Thea Bohea, 1441; chinensis, 54×; hongkongensis, 642; japonica, 641; reticulata, 641×; Sasanqua, 641×; Sasanqua var. Kissi, 641×; Sasanqua var. oleosa, 641×.
Theaceæ, 54.
Theka, 3318×.
Theobroma Cacao, 53, 2304.
Theophrasta grandis, 786×; imperialis, 767×, 2004×; integrifolia, 786×; Jussieui, 64×; longifolia, 786×; macrophylla, 786×.
Theophrastus latifolia, 786×.
Therefon, 538.
Theresia, 1280.
Thermopsis nepalensis, 2647.
Thespesia populnea, 2304.
Thibaudia glabra, 230×; macrantha, 230×; pulcherrima, 230×; setigera, 230×.
Thief-Palm, 3240×.
Thimbleberry, 3021.
Thistle, 662, 774×; Argentine, 2354; Asses', 2354; Blessed, 806, 3169; Bull, 774×; Cotton, 2354; Down, 2354; Globe, 1096×; Golden, 3120×; Holy, 3169; Oat, 2354; Pasture, 774×; Queen Mary's, 2354; Russian, 3057; Scotch, 2354; Silver, 2354; St. Mary's, 3169.
Thomas, J. J., 1599×.
Thoracostachyum hypolytroides, 1994.
Thorburn, Grant, 1600.
Thorn-Apple, 970; Box-, 1929×; Buffalo, 398×; Caffir, 1929×; Camel-, 189×; Camel's, 246; Christ's-, 664, 2436×; Cockspur, 884; Everlasting, 2863×; Fiery, 2863×; Jerusalem, 2436×, 2475; Kangaroo, 182; Washington, 886.
Thornless Blackberry, Wild, 3031×.
Thorny Mint, 192.
Thoroughwort, 1164.
Three-seeded Mercury, 190×; -thorned Acacia, 1347.
Thrift, 395, 3228; Prickly, 191×.
Thrinax, 2446; argentea, 808; argentea var. Garberi, 808; Chuco, 194×; Garberi, 808.
Throatwort, 646×, 3361.
Thryallis glauca, 1312.
Thuja articulata, 631; Craigana, 1854; dolobrata, 3337×; gigantea, 1854; obtusa var. breviramea, 731; obtusa pendula, 731×; occidentalis, 1441; occidentalis var. Ellwangeriana, 2922×; occidentalis var. ericoides, 2922×; orientalis, 1441; orientalis var. beverleyensis, 3574; orientalis var. decussata, 2922×; orientalis var. meldensis, 2922×.
Thujopsis borealis, 730×; borealis var. glauca, 730×; Standishii, 3336×.
Thunia, 2403×.
Thurber, Geo., 1600×.
Thurlow's Weeping Willow, 3053.
Thyme, 912, 3340×; Creeping, 3341×; Lemon, 3341×.
Thymelæaceæ, 58×.
Thymelæa tinctoria, 58×.
Thymus Chamissonia, 2048; corsica, 3082×; ericæfolius, 3082×; Piperella, 2048×; Serpyllum, 70; vulgaris, 912.
Thyrsanthema semiflosculare, 734.
Thyrsopteridæ, 1209×.
Thyrsopteris elegans, 1209×.
Tiarella biternata, 422×.
Tickle-Grass, 1500×.
Tick-Seed, 500, 844×; Trefoil, 991.
Tideland Spruce, 2620.
Tidy Tips, 1832.
Tiedemannia rigida, 2420×.
Ti-es, 1919.
Tiger-Flower, 3344×; Lily, 1870.
Tiger's Jaw, 2041.
Tilia alba, 3608; americana, 358×.
Tiliaceæ, 52.
Tillandsia acaulis, 903; Blokii, 3494; carinata, 3493×; exsudans, 1395; fenestralis, 3493×; guttata, 3493×; helicinioides, 3493×; hieroglyphica, 3494; musaica, 2010×; nitida, 686; picta, 3493; paittacina, 3493×; Saundersii, 3493; splendens, 3493; tessellata, 3493×; usneoides, 18×; zebrina, 3493.
Timbe, 188×.
Tinus laurifolius, 3458×.
Tinweed, 10×.
Tiny Lily, 1874×.
Tique, 229.
Tira, 1137×.
Tirucalli (Euphorbia), 1170.
Tithymalopsis corollata, 1169; Ipecacuanhæ, 1169×.
Tithymalus (Euphorbia), 1173; pendulus, 3078.
Titoki, 244×.
Toad-Flax, 1884; -Lily, 3377×.
Tobacco, 2143×; Indian, 1899; Ladies', 299; Mountain, 396.
Tobira, 2654.
Tocote Prieto, 1720.
Toddy, 811; -Palm, 679×.
Todea, 1215×.
To-Kumquat, 784×.
Tolinium variegatum, 3306×.
Tollon, 2596×.
Tolu-Balsam Tree, 2095.
Toluifera Balsamum, 42, 2095; cochinchinensis, 1352.
Tomatillo, 2608×.
Tomato, Husk, 2608; Strawberry, 2608×; Tree, 943.
Tomentosæ (Cratægus), 885.
Tom Thumb Lily, 1874×; Nasturtium, 3389×.
Tooart Tree, 1156×.
Toog, 510.
Toona ciliata, 698; serrata, 698; sinensis, 698.
Toor, 613×.
Toothache Tree, 3538; -wort, 988, 1824×.
Toot-poison, 847.
Toowoomba Canary-Grass, 2574.
Topiary-Gardening, 2675.
Top Onion, 248.
Torch-Lily, 1751×; -wood, 279.
Torenia auriculæfolia, 889×.
Toreta, 292×.
Torminaria Cluaii, 3196×; latifolia, 3196×; torminalis, 3196×.
Tornillo, 2811.
Torreya nucifera, 2304.
Tortoise Plant, 3322.
Touch-me-not, 1641×; Spotted, 1642×.
Tournefortia unbellata, 69.
Tovara, 2740.
Toxicodendron capense, 1618; vulgare, 2953×.
Toxicophlœa cestroides, 209; spectabilis, 209; Thunbergii, 209.
Toxicoscordion Nuttallii, 3549×.
Toxylon pomiferum, 1961×.
Toyon, 2596×.
Trachycarpus, 2446.
Trachyphyllum (Saxifraga) 3094×.
Tradescantia discolor, 2949×; discolor var. variegata, 2950; discolor var. vittata, 2950; erecta, 3351×; latifolia, 3351×; multicolor, 3540; quadricolor, 3540; spathacea, 2950; tricolor, 3540; undata, 3351×; variegata, 2950; zebrina, 3540.
Tragacanth, 1417.
Tragopogon porrifolius, 77×.
Tragopyrum lanceolatum var. latifolium, 427×.
Trailing Arbutus, 1120; Begonia, 776×; Fuchsia, 1302×; Hollyhock, 1484×; Lantana, 1820; Myrtle, 3471; Queen, 1302×.
Trajan's Column, 2425.
Trapa bispinosa, 2304; natans, 61×, 2304.
Traveler's Joy, 797.
Treasure Vine, 1490×.
Tree Alfalfa, 2019×; -Aster, 2333×; Celandine, 518; Fern, 1209; Lupine, 1922×; Mallow, 1974×; Mamoeiro, 2460×; Melon, 2460×; of Heaven, 241×; of Sadness, 2305×; Onion, 248; Peony, 2434; Tomato, 943.
Trefoil, Bird's-foot, 1917×; Moon, 2019×; Yellow, 2019×.
Treilliges, 2551.
Treisia (Euphorbia), 1172.
Tremandraceæ, 46.
Tremandra Family, 46.
Trevia, 3373.
Triadenum virginicum, 1632×.
Trianea bogotensis, 1882×.
Triantha racemosa, 3352×.
Trianthocytisus, 948.
Tribroma bicolor, 3331.
Tricharia, 1016.
Trichierostigma antisyphilitica, 1169×.
Trichocarpæ (Potentilla), 2773.
Tricholoma personatum, 2087.
Trichomanes, 1215×.
Trichonema Clusiana, 2979; rosea, 2979; speciosum, 2979.
Trichosma, 2403×.
Trichostigma peruvianum, 1833.
Tricker, Wm., 3554.
Tricopilia, 2403×.
Tricratus admirabilis, 175×.
Tricuspis, 3377×.
Tridactylites (Saxifraga), 3087.
Trifoliata (Acer), 203×.
Trifoliate Orange, 2752.
Trifurcia, 1476×.
Trigonella Fœnum-græcum, 42.
Trigonidium ringens, 2069.
Trincomalee Wood, 494.
Triosteum perfoliatum, 75.
Triphasia glauca, 1127×.
Triteleia candida, 577; grandiflora, 578; Howellii, 578; hyacinthina, peduncularis, 577.
Tritoma grandiflora, 1753; maroccana, 1753×; nobilis, 1753; pumila, 1754×; rigidissima, 1753×; Saundersii, 1753; Uvaria, 1752×.
Tritonia aurea, 896×.
Trochodendraceæ, 32.
Trochodendron Family, 32.
Tropæolaceæ, 43.
Tropical Almond, 3321×; Duckweed, 2650.
True Frost Grape, 3487; -Love, 2474×.
Trumpet-Creeper, 651; -Creeper, Chinese, 651×; Daffodil, 2109×; -Flower, 503, 3332×; Honeysuckle, 651×; 1911, Lily, 1867×; -Tree, 697; -Vine, 651×.
Trumpets, 3078×.
Tsuga canadensis, 1441; japonica, 2847×.
Tsusia (Rhododendron), 2943.
Tsutsutai (Rhododendron), 2943.
Tuba, 811.
Tube-Flower, 801.
Tuber, 2088×.
Tuberaria globulariifolia, 1445×; vulgaris, 1445×.
Tuberous-rooted Chinese Mustard, 544.
Tubocytisus, 947.
Tubulosæ (Clematis), 791×.
Tucker, Luther, 1601.
Tufted Hair-Grass, 988×.
Tulip Butterfly, 634×; Common Garden, 3398×; Duc van Thol, 3398; Globe, 631×; Late, 3398×; Mariposa, 633×; Meadow, 633; Parrot, 3399; Poppy, 2458×; Star, 631×; Tree, 1890.
Tumboa Bainesii, 3511×; strobilifera, 3511×.
Tumeric, 22.
Tumion californicum, 3360×; grande, 3360×; taxifolium, 3360×.
Tumpat-Kurundu, 2714.
Tuna, 2361×.
Tung-Ching Tree, 3528×; -Oil, 245.
Tunhoof, 2130×.
Tunis-Grass, 1497.
Tupa Feuillei, 1899; montana, 1899; salicifolia, 3170×.
Tupelo, 2316×.
Turban Lily, 1873.
Turbina corymbosa, 1661×.
Turbith, 68×.
Turfing Daisy, 756.
Turkestan Millet, 3158×.
Turkey Grape, 3490; Oak, 2889.
Turkey's Beard, 3524×.
Turk's Head, 612; Turban, 801.
Turnip, Indian, 391×, 392; Prairie, 2849×.
Turnsole, 47, 753.
Turpentine, 1417×; Cyprus, 48; Strasburg, 173; Tree, 3296×; Venice, 12×.
Turtle-Head, 736×.
Tussilago alpina, 1500; Farfara, 77.
Tutsan, Common, 1632×.
Tutuila, 1699×.
Twayblade, 1888.
Tweedica floribunda, 2420×.
Twin-Berry, 2057×; -Flower, 1885×; -Flower, Mexican, 545; -leaf, 1720×.
Twining Cowitch, 3365.
Twisted Stalk, 3275×.
Two-flowered Pea, 1825×; -veined Hickory, 185×.
Tydæa amabilis, 1706; Cecilïæ, 1706×; picta, 1706.
Typhaceæ, 13.
Typocerasus, 2835×.

Ugni Guava, 2096×; Molinæ, 2096×.
Uhi-uhi, 2414×.
Uhuihi, 2045×.
Ulex europæus, 41×, 42.
Ulluco, 3408.
Ullucus tuberosus, 31.
Ulmaceæ, 25×.

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Ulmaria angustifolia, 1239×; camtschatica, 1239; Filipendula, 1239; palmata, 1239; palustris, 1239×; pentapetala, 1239×; purpurea, 1239; rubra, 1239; vestita, 1239×.
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